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GEOGRAPHICAL INFLUENCES IN THE DEVELOPMENT OF WISCONSIN *

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CHAPTER I. GEOLOGICAL AND GEOGRAPHICAL CONDITIONS AFFECTING THE DEVELOPMENT OF WISCONSIN

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The early history of a country depends in large measure on its location and physical characteristics. These factors, together with the character of the surrounding region, determine for a country its climate, drainage, products, and relation to the rest of the world.

The most important factor in the early history of Wisconsin was its key position between the Upper Great Lakes and the Mississippi River. Within the state these great water systems approach each other so closely that in places their flood waters mingle and a canoe may pass from one to the other without a portage. Upon

* Originally presented as a thesis for the degree of Master of Science at the University of Chicago in 1910; later revised to its present form. The paper embraces seven chapters. Chapters II to VII will follow in the next six numbers of the *Bulletin*.—ED.

this peculiar location depended the early discovery, exploration, and settlement of Wisconsin.

The northern part of Wisconsin is underlain by pre-Cambrian crystalline rocks, more or less covered by drift. Granitic rocks out-

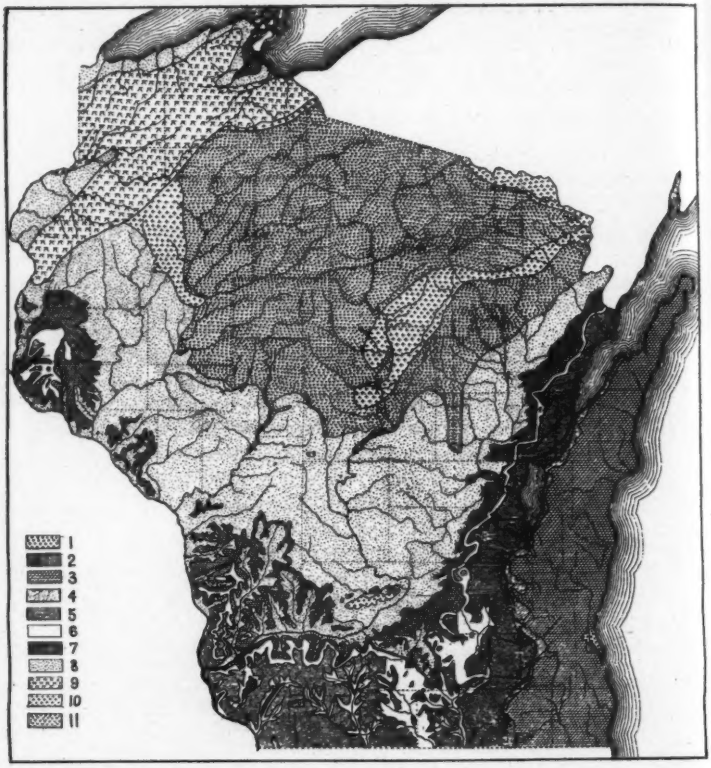

FIG. 1—General Geological Map of Wisconsin, reproduced from Geology of Wisconsin, Vol. I. Scale, 1:4,500,000.

1, Hamilton Cement Rock; 2, Lower Helderberg Limestone; 3, Niagara Limestone; 4, Hudson River Shale; 5, Trenton (and Galena) Limestone; 6, St. Peters Sandstone; 7, Lower Magnesian Limestone; 8, Potsdam Sandstone; 9, Keweenawan or Copper-bearing Group; 10, Huronian or Iron-bearing Group; 11, Laurentian Group.

crop over the central portion of this area, and adjacent to them are the iron-bearing Huronian formations. The latter outcrop along the Menominee River and in a narrow strip extending thence southwest to the Wisconsin River. They are exposed at the north in the Penokee Iron Range and at the west in Barron and Burnet Coun-

ties (for location of counties see Fig. 4). The Keweenawan or copper-bearing group outcrops all across the northern part of the state from the Michigan line at Lake Superior to Minnesota. The Douglas Copper Range is formed by the faulting of these formations. Paleozoic formations dip away from the pre-Cambrian center and are exposed in bands, the older and lower ones outcropping near the center and the younger and higher ones farther away (Fig. 1). The nonresistant Paleozoics, the Potsdam sandstone, St. Peters sandstone, and Hudson River shale lie below the Lower Magnesian, Trenton-Galena, and Niagara limestones respectively. The limestones are resistant and therefore outcrop as ridges, whose eastern and southern dip slopes are long and gentle and whose western and northern slopes are precipitous in many places and bare of vegetation. The ridges are much cut by streams and reduced by glaciation.

Speaking in general terms, Wisconsin has a rolling surface of moderate elevation, averaging 1,050 feet above sea-level. The altitude varies from 600 feet to 1,800 feet, the latter height being reached at but one or two points. Although without great relief, the surface is far from level; there are many small, nearly level plains, and there is much land which is quite rough.

The most important topographic feature in the state, historically, is a remarkable depression which extends across it from Green Bay to the mouth of the Wisconsin River (Fig. 2). This is known as the Fox-Wisconsin depression and is continuous except for a mile and a half over the low divide at Portage. This depression was of great importance in the early history of the state as a route of travel and commerce between the Great Lakes and the interior.

The most conspicuous elevations are Military Ridge and the Winnebago Escarpment. Military Ridge[1] extends in an east-west direction between Madison and the Mississippi River, parallel with and nearly 15 miles south of the lower Wisconsin River. Along the crest of this ridge was built the western part of the military road between Green Bay and Prairie du Chien, one of the earliest and best known roads in the state. More striking than Military Ridge is the Winnebago Escarpment. Beginning on Door Peninsula, it extends southwest to Lake Winnebago, turns south along the eastern shore of the lake, dies out toward the south and is buried finally under the drift in the southern part of the state. Between Green Bay and Lake Winnebago it forms the high east bluff of the Fox River, attaining an elevation of 1,200 feet above

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Collie, Geo. L.: Physiography of Wisconsin, *Bull. Am. Bur. Geog.*, Vol. 2, p. 273.

sea at the lake. When Nicolet first came to Wisconsin the Indians had a fort on this bluff at Green Bay. Another fort guarded the outlet of Lake Winnebago and enabled the Indians to collect toll

Fig. 2—Relief Map of Wisconsin, by permission of the Wisconsin Geological Survey. Scale, 1:4,600,000.

from boats passing this point. These escarpments are caused by an outcrop of hard Niagara limestone above nonresistant Hudson River shale.

More than four-fifths of Wisconsin is covered by glacial deposits (Fig. 3). Most of the drift was deposited by the last Wisconsin glacier, but older drift occurs in the southern part of the state in Rock, Green, and Dane Counties, and again in the north central part, from Wood and Marathon Counties west to the Mississippi

River. The area of older drift has some of the characteristics of the younger drift area and some of those of the driftless region. The glacial deposit is thinner than that on the more recently glaciated region and consequently controls the topography to a less degree. The rivers are mature and the drainage is good. The surface covered by the later drift has the character of a typical ground

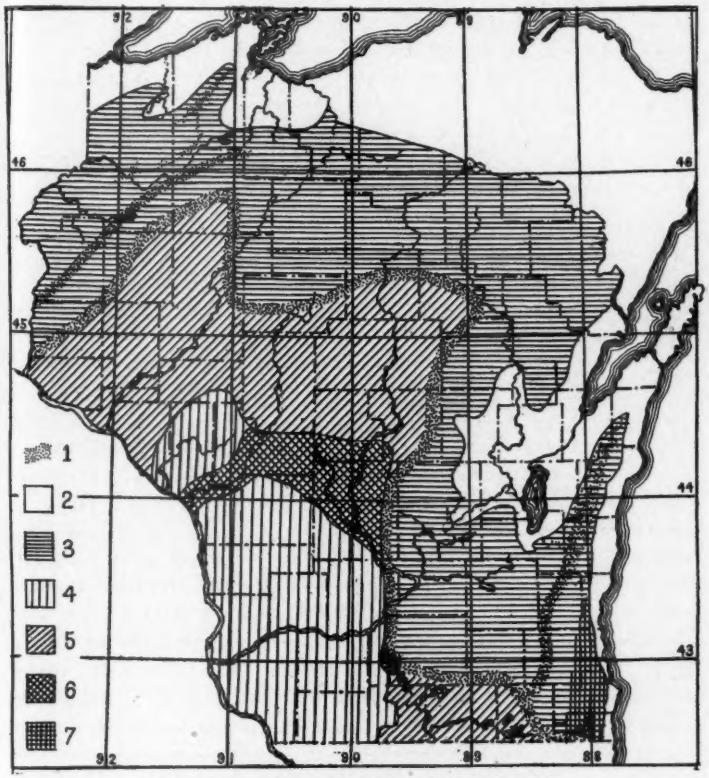

FIG. 3—Glacial Map of Wisconsin. Scale, 1:4,500,000.

1, Kettle Moraine; 2, red pebble clays (subaqueous) and associated beach and shallow-water deposits; 3, drift of the second Glacial Epoch; 4, driftless area; 5, drift of the first Glacial Epoch; 6, lacustrine and fluviatile drift beyond the general drift area; 7, gray pebble clay (subaqueous).

moraine; young valleys, marshes, lakes, undrained depressions, low hills and drumlins, a generally rolling surface, broken here and there by a nearly flat lake bed or outwash plain. Near the edge of the last Wisconsin drift is the Kettle Moraine, which is the

terminal moraine of the last great ice-sheet. It lies in great loops, formed by the lobes of the glacier. Beginning on Door Peninsula it extends south-southwest to Walworth County. Here it loops to the west and then extends north along the Wisconsin River to Langlade County, from where it has a zigzag course to the Mississippi River at River Falls (Fig. 3). The Kettle Moraine is a distinct topographic feature. It has a belt-like form and an uneven surface, on which kettles and kames of unusual size are frequent. While the soil on the Kettle Moraine compares favorably with that of many of the more level parts of the state, its irregularity of surface in many places precludes its use for cultivation and makes it a grazing region or a timber country.

Beyond the Kettle Moraine there are in places outwash deposits of considerable size, whose surfaces slope gently from the moraine. Most of these outwash plains are very fertile, and they include some of the best farming land in the state.

In contrast with the glaciated region is the driftless area, which occupies some 10,000 square miles in the southwestern part of the state. The region was once a plain in which the streams have deepened and widened their valleys until the remnants of the old plain appear as ridges between the low flat valley bottoms. As a whole the area is in a mature stage of erosion, but there are places where it is still young and others where it is well advanced toward old age. The bed rocks are nearly horizontal. The valleys are steep-sided and usually 150 to 200 feet deep. The drainage is good; there are neither lakes nor marshes. In the southern part of the area, where the surface rock is of limestone, the remnants of the old plain take the form of "dome-like mounds,"[2] of which the Blue Mounds, lying 25 miles west of Madison, are the best examples. The Blue Mounds are monadnocks covering 5 square miles and having an elevation of 1,729 feet. Farther north, where the more easily eroded Potsdam sandstone is the prevailing rock, the erosion remnants have a different form, and we find the peculiar architectural effects of the Camp Douglas plain.

The earliest settlements of importance in the state were in the lead region in the unglaciated area (Fig. 8).* The working of the mines and the market produced thereby proved an attraction for a small agricultural population. When the great agricultural settlement of the state began in 1832 the unglaciated area was neglected somewhat for the drift plains farther east. In 1847 there was al-

[2] Collie, G. L.: *op. cit.*, p. 278.

* Will illustrate Chapter III.—Ed.

most no settlement north and west of the Wisconsin River (Fig. 9).* In general the percentage of improved land and the density of population is less in the unglaciated counties than in the glaciated area. The value of farm land is less in the unglaciated area, and the average size of the farms is greater than in the glaciated area. The soils

FIG. 4—County Map of Wisconsin. Scale, 1:4,500,000.

of the glaciated area are more varied, inviting a greater diversity of crops, and the topography is less rough, giving a greater area of tillable land than in the driftless region. The amount of water power is much greater in the drift covered area, and it determines to some extent the location of the manufacturing plants.

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*Will illustrate Chapter III.—ED.

Wisconsin is divided into two main drainage areas, one sloping north toward Lake Superior and the other sloping radially toward Lake Michigan and the Mississippi River. The watershed separating these two slopes "is a wide and nearly flat tableland" with a height of 600 feet above Lake Superior "on the Minnesota border and over 1,000 feet on the Michigan line. Its average distance from Lake Superior is 30 miles."[3] (Fig. 2.)

The drainage slope of Lake Superior has, in general, three distinct types of topography. The southernmost belt "consists of a plateau, in large part covered with swamps and lakes and is so flat that in many cases water from the same swamp may flow either north to Lake Superior or south to the Mississippi."[4] From this tableland there is a gradual descent northward to the Penokee and Douglas Ranges, which rise 600 to 900 feet above the lake. The northern face of the ranges is a fault scarp, which makes that slope more abrupt than the southern. It is at this point, where the Lake Superior rivers cross the ranges, that stream gradients are greatest and falls and rapids most numerous. Here occur Copper Falls near Mellen, where Bad River makes a descent of 60 feet; Tyler Forks Fall, where Tyler Fork of Bad River drops 45 feet into its main; the Dalles of the Bois Brulé River; and the Rapids and falls of Black River, where the river makes a total descent of 200 feet in 4 miles just before it joins the Nemadji. Between the highlands and Lake Superior is a plain 5 to 15 miles wide, which ends in wave-cut cliffs along the shore of Lake Superior. The red sandstone of the cliffs is quarried in a number of places along the shore of the mainland and also on some of the Apostle Islands. The surface of the plain consists of till and thick layers of red clays, mixed in places with sands. The streams have cut steep-sided valleys in this loose material, 25 to 100 feet deep, making railroad and highway construction expensive.

South of the general divide noted above the land slopes radially to the southeast, south, and southwest, and supports several large rivers. All the more important rivers, except the Rock, begin and end within the state. In general, each of these rivers may be divided into three parts which have distinct characteristics. "First, the head waters marked by sluggish streams with low divides, fed by numerous and extensive swamps and lakes, frequently so interlaced that it is impossible to trace the water divides."[5] Boulder rapids frequently occur in the upper courses. "Second, a stretch of maxi-

[3] Smith, L. S.: Water Powers of Wisconsin, *Wis. Geol. and Nat. Hist. Surv. Bull. XX*, p. 251.
[4] Smith, L. S.: *op. cit.*, p. 250.
[5] Smith, L. S.: *op. cit.*, p. 10.

mum descent along the center reach of the river, abounding in numerous falls and long stretches of rapids.[6] This part of the river is always in the regions of the pre-Cambrian crystalline rocks, the southern border of which marks the lower limit of the rapids."[6] "Third, the lower portion of the course, where for a distance of about 50 miles the river flows through sandstone and limestone, the descent being very slight. This region is therefore devoid of water power. In fact, the United States government has improved the larger rivers along this reach for the purpose of navigation without the use of locks."[6]

There are only two important exceptions to the rule that the falls and rapids occur in pre-Cambrian crystalline regions. One is The Dells of the Wisconsin at Kilbourn, where, having been forced out of its old channel by the glaciers, the river has for a distance of 7 miles cut a deep, narrow gorge in the Potsdam sandstone. From a width of 1,400 feet the channel narrows suddenly to 200 feet and at "The Narrows" to 40 feet. Through this gorge the water flowed at a rapid rate until ponded back by the recently constructed dam at Kilbourn. The other exception is the water power at Eau Claire at the junction of the Chippewa and Eau Claire Rivers, both of which flow over Cambrian sandstone. The falls and rapids in the area of crystalline rocks are due to a lack of adjustment of the streams to their beds. The streams originated on the Paleozoic rocks which once covered this region and wore their beds down through these strata to the pre-Cambrian rocks. They continued to sink their channels into the resistant rocks with the same meandering courses that they had acquired on the softer Paleozoics. The streams were compelled to flow over rocks of varying hardness, and falls and rapids were developed.[7] At the edge of the pre-Cambrian and overlying Paleozoics the soft sandstone has been largely removed and the "recently superimposed streams are just beginning to sink their valleys into the underlying crystallines."[8] Along this line are located the towns of Chippewa Falls, Neilsville, Black River Falls, Centralia, Grand Rapids, and Stevens Point, each with important water power. The area of pre-Cambrian rocks did not encourage early settlement. It was covered by pine forests and the lumber interests drew the first population, which was more or less transient. Agricultural settlement was made very slowly because of the unpromising prospects

[6] Smith, L. S.: *op. cit.*, p. 10.
[7] Weidman, S.: The Geology of North Central Wisconsin, *Wis. Geol. and Nat. Hist Surv. Bull. XVI*, p. 620.
[8] *Ibid.*, p. 621.

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offered by the cut-over pine land. The location of all the large towns has been determined by the presence of rapids or falls, which also determined the location of the first sawmills. The future of the crystalline area will no doubt be very different from its past history.

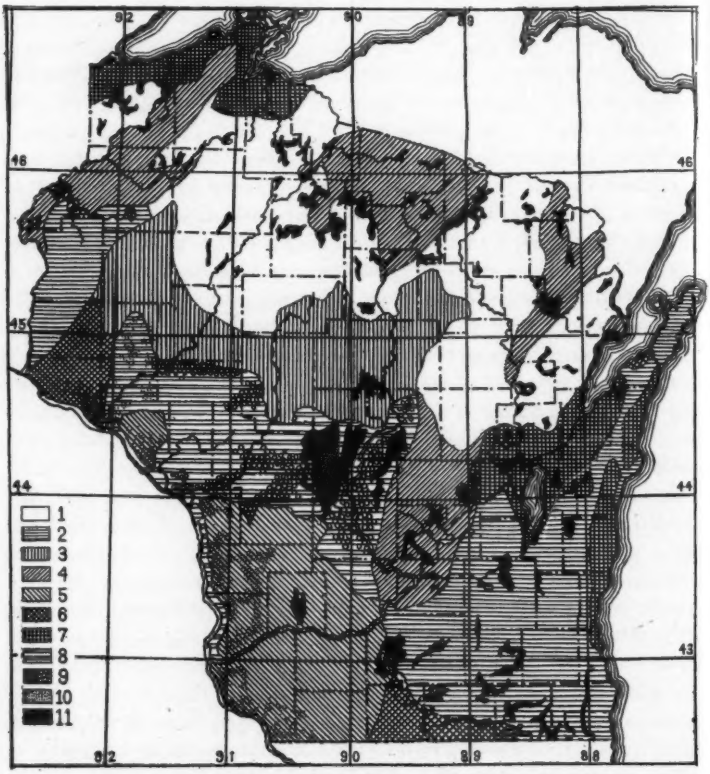


FIG. 5—General Map of the Soils of Wisconsin. Scale, 1:4,500,000.

1, last glacial clay on crystalline rock; 2, last glacial clay on lime and sandstone; 3, old glacial clay on crystalline rock; 4, sandy soils of last glacial period; 5, residual clay on lime and sandstone; 6, old glacial clay on lime and sandstone; 7, red clay, chiefly of lacustrine origin; 8, residual sandy loam; soils of Potsdam sandstone; 9, residual sandy soils of Potsdam sandstone; 10, loess; 11, muck and peat.

As the industrial interests of the state develop, the value of the water power will increase, particularly in view of Wisconsin's lack of coal. Important industrial cities probably will develop in the future in north central Wisconsin. So far as known not a single im-

portant river in the state has been made to fully yield its available water power. "The lower Fox has been developed most completely, having produced a total of 31,898 horse power"[9] in the 35 miles between Lake Winnebago and Green Bay. In 1905 the amount of water power developed in the state was "only 124,400 horse power."[9]

Mineral products[10] of commercial value are neither numerous nor extensive in Wisconsin. Iron is found in the Huronian rocks of the northern part of the state, and near Baraboo. The Potsdam sandstone yields iron at several points in Richland, Crawford, Vernon, and western Sauk Counties, and Clinton iron ore is mined at Iron Ridge and Mayville in Dodge County.

The Keweenawan, or copper bearing, rocks have never yielded copper in quantities of commercial importance in Wisconsin, although the same formations give large returns in the northern peninsula of Michigan.

The Trenton-Galena limestone in the southern part of the driftless area has been mined for lead and zinc since the French first taught the Indians the use of lead in fire arms and its value as a medium of exchange. This source of wealth has had a distinct bearing on the history of the state from the earliest records down to the present time.

Building stone is plentiful and of good quality. The pre-Cambrian rocks are quarried for granites, porphyries, quartzites, and gabbros ("Duluth Granite"). White and brown sandstone come mainly from the Potsdam, although St. Peters, while usually very soft, yields some stone of value. The Niagara formation of the eastern part of the state yields a good limestone, as does also the Trenton-Galena in places.

The soils of Wisconsin are partly residual and partly transported soils. Those of the driftless area are mostly residual. There is some loess along the Mississippi River and alluvial material in the stream valleys, but in general the soil may be said to be the insoluble residue of the rock which once occupied its position. The soil map (Fig. 5) shows that the clay of the central and southern parts of the driftless area is the result of the disintegration of limestone, and that the sandy soil and loam of the northern part come from the Potsdam sandstone.

The transported soils of the drift-covered area are not so closely dependent upon the underlying rock for their constituents. Nevertheless, glaciers move the bulk of their load but a short distance from

[9] Smith, L. S.: Water Powers of Wisconsin, *Wis. Geol. and Nat. Hist Surv. Bull. XX*, p. 1.
[10] Geology of Wisconsin, Vol. I, Pt. III: Economic Geology.

its source, so that the soil of the glaciated area consists of a large amount of material from the local bed rock, mixed with a smaller amount from all the formations which have contributed to the load. The soil of a lake, marsh or peat bog deposit is finer than ordinary drift and contains a higher percentage of humus. The lacustrine clays bordering Lake Michigan, Green Bay, and Lake Superior testify to the once greater size of these bodies of water. The numerous muck and peat deposits point to the presence of post-glacial lakes and marshes, now wholly or partly filled.

The climate of northern Wisconsin is characterized by a large amount of sunshine with high temperature in summer, and extreme cold, deep snow, and clear skies in winter. The summer heat and winter cold are generally tempered by the influence of Lakes Michigan and Superior, which cover an area of 54,000 square miles and never freeze over in winter. The prevailing wind is from some westerly quarter, but this is broken up so frequently by the passage of storm centers that the winds often come from over the lakes and affect both the temperature and humidity of the air. The extreme southern part of the state is considerably warmer than the northern part, having less of extreme cold and deep snow in winter but having a greater degree of heat in the summer. The rivers of the state are generally frozen between December 1 and March 30. "The average rainfall for twenty-five years over the entire state is close to 32.3 inches, distributed by seasons as follows: winter, 4.7 inches; spring, 7.6 inches; summer, 11.7 inches; autumn, 8.3 inches. It is worthy of note that 60% of the rainfall comes in the summer and autumn months, while the least fall is during the winter months." [11]

The difference in the climate of the northern and southern parts of the state has made a difference in their development. The milder climate of the southern part encouraged its earlier settlement, and also permits the extensive cultivation of maize, which is almost prohibited in the northern part by the shortness of the growing season.

[11] Smith, L. S.: Water Powers in Wisconsin, *Wis. Geol., and Nat. Hist. Surv. Bull. XX*, p. 15.

(*To be continued*)

THE FISHING BANKS OFF OUR ATLANTIC COAST

By GEORGE CARROLL CURTIS

(Map facing p. 420.)

Origin of the Banks on the Atlantic Coastal Shelf of North America.

During a recent trip (March 16 to 28, 1912), taken on a market fishing schooner to Georges Bank and other of the outer great fishing grounds lying off the Gulf of Maine, a comprehensive collection of specimens was obtained. From the armed sounding lead the nature of the finer material of the bottom could be seen, and rocks up to six to eight inches in diameter were drawn up by the marine growths attached becoming entangled in the fishermen's gear. The character and variety of this collected material give evidence of the origin of these off-shore banks, and the deductions appear to have considerable bearing on the present vital subject of conserving our most important source of common fresh fish supply.

Georges Bank is a shoal of the sea lying in the open ocean about 100 miles east-southeast of Cape Cod. The depth of this bank, which is roughly 70 miles square in extent, averages from 15 to 30 fathoms, though in its middle portion there are spots with so little as 12 feet of water over them where, in storm, seas run "mountain high." Between this shoal ground and the mainland there are depths of over 100 fathoms, nearly 900 feet being found in spots, while on the eastern side the water falls off rapidly from the 50 fathom to the 100, 500 and 1,000 fathom line of true oceanic depths.

To the west, between Georges Bank, on the one hand, and the lands of Cape Cod and the shoals of Nantucket on the other, is what mariners call "the Channel," with depths from 50 to 100 fathoms, while to the north of Georges Bank is another trough where the soundings average considerably over 100 fathoms, or 600 feet. These "gullies" probably represent old channels once draining northern New England. On the north side of this deep gully lies a shoal ground of similar depth and character as Georges Bank, but only about a third as large in area, known as Browns Bank, some 60 miles off Cape Sable, Nova Scotia, from which it is separated by a moderately deep depression. These elevated portions of the sea bottom are so situated that they have long been the chief source of the fresh fish supply for the eastern seaboard of the United States.

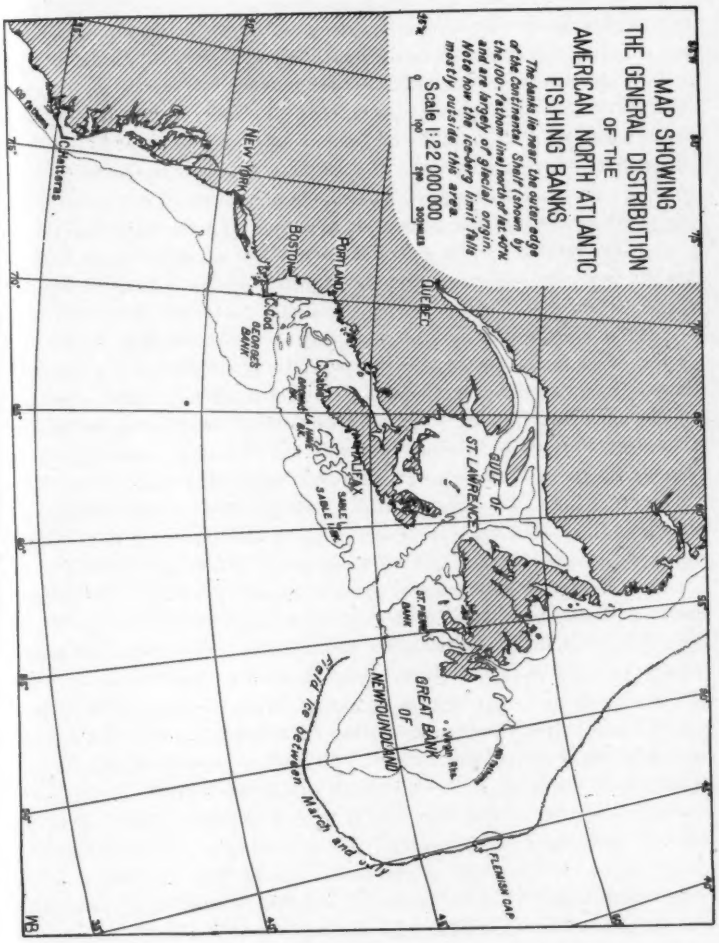
There are various other banks or off-shore shoals along the Nova

Scotia, Cape Breton and Newfoundland coasts, terminating in the largest of all, the Grand Banks of Newfoundland. All these lie upon the comparatively shallow marine margin bordering the Atlantic coast, known as the continental shelf, which is usually assumed to be composed of the waste worn from the lands and deposited in the sea along the shore margin of its basin. It has been held, indeed, that the greater width of this Atlantic shelf, compared to the narrow bordering coastal rim in the same latitude on the Pacific side of the continent, has been gained through the laying down of a vast amount of detritus, the remains of lofty mountains whose roots alone now exist upon our north Atlantic coast. Be this as it may, another factor seems to have played a very important part in this upbuilding of the continental border and appears to be the chief agent in the origination of at least the shoaler parts, which constitute the best fishing grounds of North America and probably of the world.

The material recently collected from Georges Bank and Browns Bank bears the stamp of glacial origin. There is a variety similar to that found in glacial deposits on the mainland. The pebbles, boulders and sand which constitute the bottom are characteristically glacier-worn rather than water-worn, as would result were these banks essentially of littoral or marine origin. The rocks are largely subangular, of great variety of formation and mineral content.

Two lines of deposits mark the southernmost limits of the great ice sheet, which occupied the northern portion of this continent in Pleistocene times. The outer moraine, where the materials brought by the glacier, sand, gravel and boulders, etc., were left, can be readily traced. On the Atlantic border of the southeast coast of Massachusetts, it largely built up the morainal islands of Nantucket and Martha's Vineyard, whose gentle south-sloping plains represent the sands washed out from the old retreating ice-front, and whose rough and hummocky exterior or backbone, the irregular surface produced under the moving ice margin. This well-defined terminal moraine continues westward, appearing again in No Man's Land and Block Island and forming the "keel" of Long Island, from whence it is traced through Staten Island, northern New Jersey, southern Pennsylvania, through Ohio to the junction of the Ohio and Mississippi, sweeping westward into Kansas, and then northward through Nebraska and Dakota.

The islands south of New England do not constitute the original limit of the glacial deposits, for the ocean has been eating back the land during thousands of years, and the sea of shoals which extends some 40 to 50 miles to the south of Nantucket undoubtedly indicates


MAP SHOWING
THE GENERAL DISTRIBUTION
OF THE
AMERICAN NORTH ATLANTIC
FISHING BANKS
The banks lie near the outer edge of the Continental Shelf (shown by the 100-fathom line) north of lat. 40°N. and are largely of glacial origin. Note how the iceberg limit falls mostly outside this area
Scale 1: 22 000 000
100 200 300 MILES
Chesterras
NEW YORK
BOSTON
PORTLAND
St. John
HALIFAX
QUEBEC
GULF OF
ST. LAWRENCE
St. George's Bank
Sable I.
Grand Bank
St. Pierre Bank
NEWFOUNDLAND
GREAT BANK OF
FLEMISH CAP
Field ice between March and July

their former extent. It seems that the present 20 fathom curve is a conservative estimate for one of the ancient shore lines. If the depth of the old channel of the Hudson River in the coastal shelf be taken as evidence, there is ground for holding that in the region of New York the land once reached over 100 miles farther to sea, during which time Boston's site probably lay twice that distance inland.

We have conclusive evidence that movements of the land along this portion of the Atlantic Coast, both of elevation and depression, have taken place in the past and are even going on at present. Old shore lines where the changes of level of 160 to 300 feet are distinctly shown occur on the islands and shores of the coast of Maine. Professor Shaler stated his view that evidence of a change of level of over 1,000 feet was to be found at Mt. Desert, and detailed studies for the past two seasons, along the Maine, Nova Scotia, Cape Breton and Newfoundland coasts, have borne out this view.

At the time when the land stood at the very moderate higher elevation of some 120 feet, Cape Cod would have extended 5 miles farther to the eastward and the land about Nantucket 30 miles seaward.

Georges Bank under such conditions might appear as an island over 100 feet above the sea, resembling Nantucket and Martha's Vineyard, though of twice the size of their combined areas. The evidence is that such was a former configuration of the coast, and that there lay at a little over 100 miles off the Massachusetts shore an island about half the size of Ireland, a true Atlantis out at sea.

The changes of level which took place along the northern Atlantic coast in Pleistocene times have not been uniformly in one direction nor of continuous regularity over broad areas. In some portions, as in the vicinity immediately south of Portland, Maine, the general character of the bordering lands is that of an elevated coast plain, while in the region of Penobscot Bay the coast is typical of the half-drowned stage of submergence. Still other localities, including some of the outlying drift-covered Maine coast islands, present evidence of having remained at their present level, at least since the glacial epoch. This stationary attitude, however, appears to have been the exception, and differential oscillatory movements, both of depression and elevation, have formed the ruling condition. The submergence of over 2,000 feet, indicated by the still traceable portion of the old Hudson River channel, gives on our coast opportunity to measure a greater change below sea level than the coastal elevation of 1,500 feet at Mt. Desert Island affords for determining how great the maximum uplift has been. The southern coastline of Newfoundland with its thousand feet elevations confirms the view of

Shaler that the summit of Mt. Desert Island bore evidence of the former presence of the sea. With the records of elevations and depressions of over 1,000 feet there is no difficulty in assuming the few feet of movement required to convert the shoals of Georges Bank into an island, farther from the coast and greater in size than any now existing. The former presence of an Atlantis 100 miles at sea between Boston and New York is seen to rest on rational geological factors.

The fishing banks, then, lie on the continental platform which reaches along our Atlantic coast in the form of a shelf gently dipping from the land into a hundred fathoms of water, where, in a quick descent, it drops steeply to the thousand fathom depths of the ocean floor. Off Cape Hatteras the width of this shallow margin is but 20 miles, but this gradually increases northward until, in the vicinity of Sandy Hook, it has a breadth of about 100 miles, while off the New England shore it extends twice this distance to sea. The marked increase in width towards the north takes place as the southern unglaciated area is left, suggesting that the coincidence has connection with the extended submerged land rim. It would seem that the greater width of the coastal shelf, though undoubtedly connected with coastal submergence, must have been considerably increased by the addition of glacial deposits.

The islands of Nantucket, Martha's Vineyard, Block Island and Long Island represent for the most part great terminal sand plains built from the waste washed out from a glacier front, and their arrangement is doubtless connected with interlobe effects produced through the ice splitting against Mt. Washington, Mt. Katahdin and other of the higher summits of northern New England. The former southward extent of these morainal islands may be traced in the shoal water reaching near 100 miles seaward; indeed, there is now but a shallow channel separating Nantucket Shoals from Georges Bank, which it would require only some minor change of level, when compared with what has taken place in the past, to join by continuous land. It is thus but a short step from the formation of Georges Bank to that of the Elizabeth Islands, and it seems logical to hold that Georges Bank and Browns Bank are but underwater representations of the terminal moraine sand plains which lie above water to the westward. The materials drawn up from the fishing grounds bear out this view. Moreover, the general configuration of the open ocean shoals and their detail of bottom form, the kettle and kame topography and the backbone of irregular moraine deposit attributed to the over-riding of the glacial cover, seem to be traceable

by soundings. Many such holes and hillocks of the bottom were detected by our sounding lead suddenly slipping into increased depths of five to eight fathoms.

From the fact that these outer shoals lie on the continental shelf and are confined mostly to the outer terminal moraine of the last ice advance, it is apparent that their extent is restricted to a comparatively small area, and that the searches for new fishing banks south of the terminal moraine will be fruitless. This limited distribution emphasizes the need for the careful conservation of the exceptional wealth of common food fishes, particularly the cod and haddock, which flourish on these specially adapted habitats.

Fishing Methods, and the Conservation of the Fish Supply

Georges Bank is regarded by fishermen as one of the richest fish grounds in the world, and the Georges cod, which are here found in great size and abundance, are said to be the finest caught. The shoal water, the strong Bay of Fundy tide, and the frequency of gales make these banks exceedingly rough, and the record of disaster here is long and terrible.

Of late years improvements in design in the fishing vessels and method of fishing have lessened loss. February and March have seen the greatest number of shipwrecks. On the evening of Feb. 24, 1862, a terrible gale from the northwest burst suddenly upon the fishing fleet on Georges Bank, there being about 70 sail at anchor in a small space, for fish seem to congregate in comparatively small spots here. Without sufficient warning, they were unable to heave up anchors. Thirteen vessels with their entire crews were lost largely through collisions, and two abandoned. Nearly every vessel was damaged; one hundred and twenty men were lost, leaving 70 widows and 140 fatherless children.

Only a few vessels, known as "Georgiamen"—ancient hulks with crews of old fishermen aboard who use the hand line from deck—now anchor on Georges Bank, so danger of collision from parting cables has been greatly lessened. The modern fishing schooner with her yacht-like design rides out the hardest gales, either under her foresail or with a triangular riding sail set in place of the mainsail, she "jogs it out," *i. e.*, with one small sail set and trimmed flat down, she is left to ride out the gale in the wind's eye. This she usually accomplishes in a remarkably seaworthy way.

How the fish are caught to-day may be illustrated from the notes written during this recent trip:

Saturday, March 16. Leave " T " Wharf [Boston] at 10 A. M. Brisk northwest wind. Run down the harbor under jibs, and foresail is set. Course east by south. Wind lightens toward evening and continues thus through the night.

Sunday. East to northeast winds. Vessel close-hauled all day. The sea is smooth. We see a few schooners returning from Georges, and a steamship passes. Good weather continues throughout the night. Am awakened by the sawing of the lead line over the rail. It is shortly before daylight. We are in thirty-five fathoms of water, and on the northern edge of Georges Bank.

Monday. The skipper from his bunk gives the order to " bait up." Breakfast is ready in the forecastle; the men are below in the waist of the vessel baiting the trawls (long lines with many hooks attached) with chopped-up frozen squid. Several schooners now come into view, some within a mile or less, others near the horizon. They also are preparing to fish. Soon the first dory of the string of ten is hooked upon the tackles and lifted from the " nest " over the side. Two half kegs of baited trawl line are placed in each boat with a basket of extra squid bait. There is also a sail, two pairs of oars, gaff, fish fork, jug of water, a girdy, or hand windlass, to start the trawls, a pail, compass, some food, knife and anchor. Two dory mates tumble into the bouncing little boat and are cast off. One man rows, the other with a little stick throws out the trawl line hook by hook. As the vessel sails on, the other dories first from one side then the opposite quarter, are put overboard and set adrift about a fifth of a mile apart. The first dory is now but a speck in the horizon, seen occasionally as she rises on a sea. The schooner is headed back, passing down her line of busy fishermen to leeward of the first boat, and hauls up to wait.

An oar is raised in one of the dories. The skipper bears down toward it, the vessel is thrown into the wind, the dory's painter is caught, and the men begin to pitch upon deck the catch with which they have loaded the boat. It consists of medium-sized haddock and big codfish, many four feet long, weighing 30 pounds and over. Wooden partitions are set athwart-ships and held between the bulwarks and house by cleats, the cod and haddock being heaped in separate pens. Some of the fish are about all a man can lift on his three-tine fork. Other boats which have become laden by this time are also picked up, some running down the wind with their sails. The deck pens grow in number and become filled to overflowing with silvery haddock and huge, greenish, glass-eyed, gaping-mouthed codfish. Tne dorymen hurry below for a " mug up " —hot coffee and tea, and a "layout" of ham, corned beef, potatoes, pies, doughnuts, bread and butter, cheese, and whatnot, spread by the cook on the racked table.

By the time this pair of dorymen have swallowed a substantial lunch effected with great rapidity and are off again, another dory is alongside, with a heavy burden of still flapping fish. All day long, for this was an exceptionally good fish day, this program is repeated, the vessel ranging up and down trying to keep run of the

dories which are continually getting out of vision, some drifted away by the strong wind or tide from others which have caught their gear on bottom and are " hung up " to windward. We counted twelve other schooners likewise tending their fishing boats. Just at dark in a rising wind the dories came for the last time, each being hoisted on deck and lashed down. The decks from the after-side of the cabin to the mainmast were now level full to the rail with fish, mostly large cod, thirty-five thousand pounds the skipper estimated.

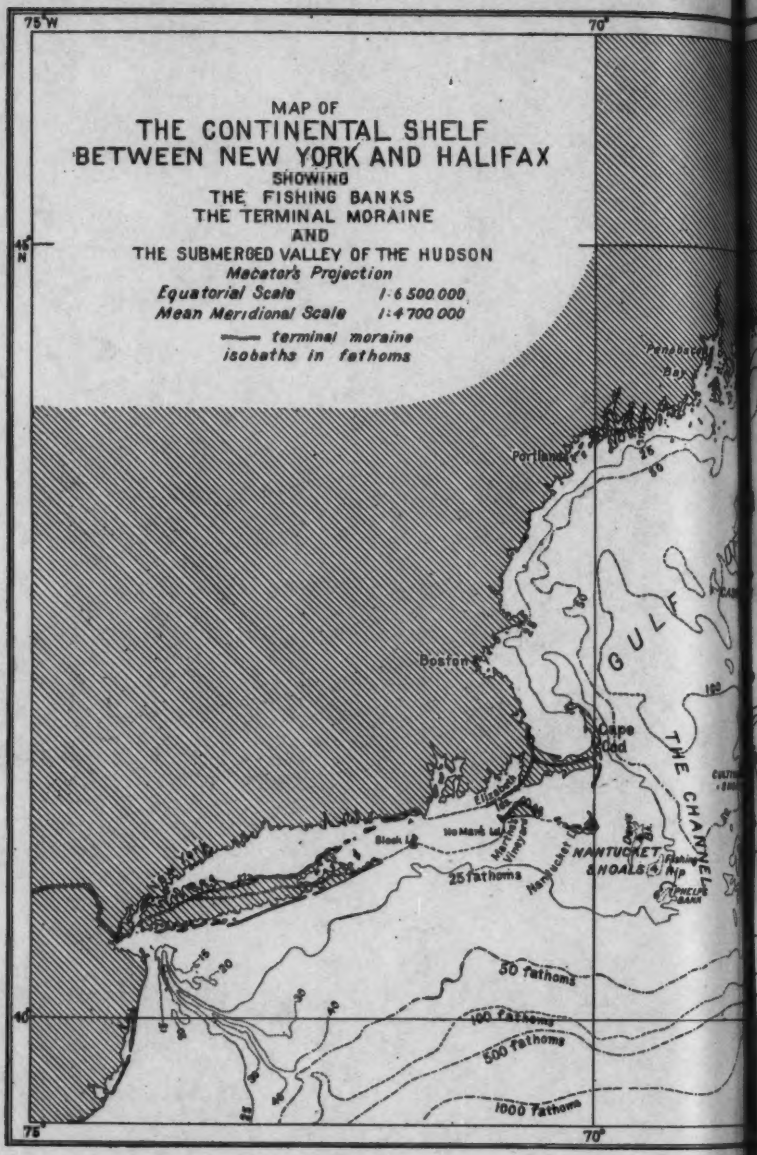
After supper the men hastened back on deck and under the light of a dozen flaring torches began to dress the fish. They were then washed in hogshead tubs, and when they were stowed away with chopped ice in the hole, it was late in the night and the weary workers, save the two whose turn it was to be on half hour watch, crawled into their stuffy bunks.

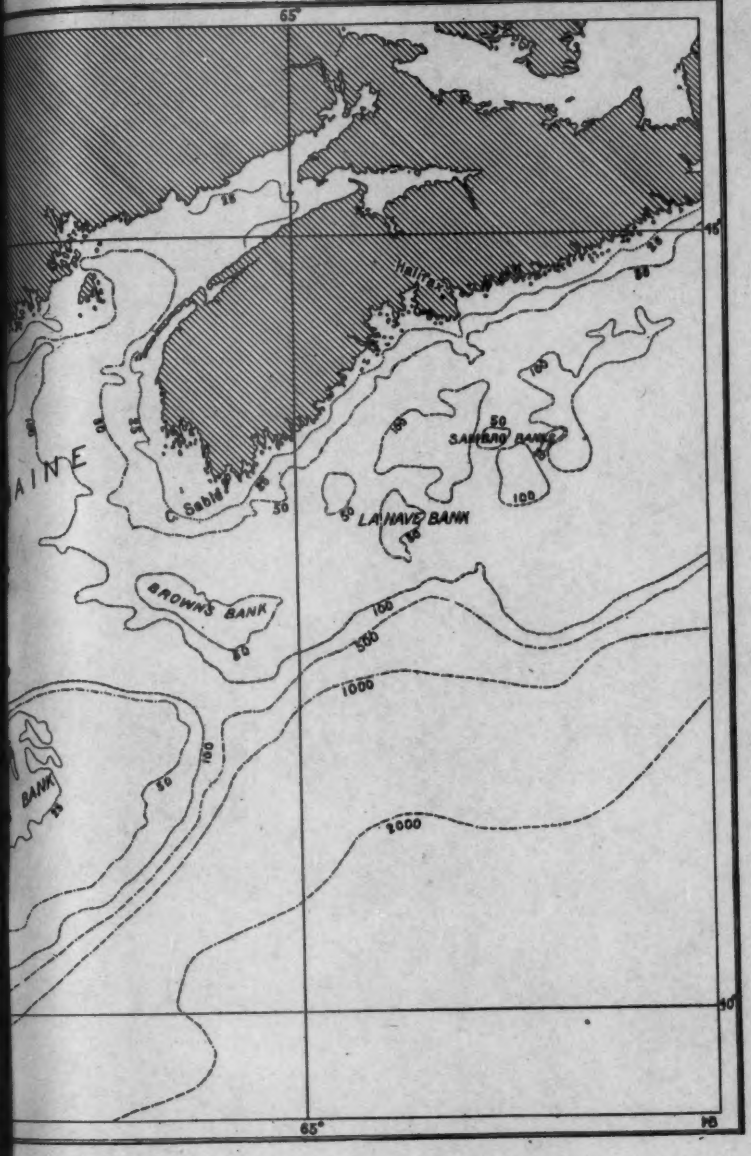
March 23. Not a " fish day." Seas ran high and frequently came aboard as we " jogged out " the gale. In the afternoon it let up somewhat. The mainsail and jumbo were set, and the vessel headed for Browns Bank, some 60 miles away to the northeast, where the skipper hoped to find large haddock. As we drew off the Bank into the deeper water of the channel, the sea became less disturbed.

Having sailed a ten-mile clip, sunset found us in 38 fathoms over Browns Bank, and here we " hove to " till daylight.

March 24. Wind and sea eased up during the night. At 2 A. M. the watch called the skipper, reporting soundings and a vessel's light. At 2.30 the cook was called, and all hands went on deck to bait trawls by torchlight. Breakfast was announced, and then the dories put overboard. For a while there was a good chance to fish, but the wind blew up, bringing thick, damp snow, and the skipper was glad to get back all the dories, which, as they came, were thrown violently against the schooner. The catch was good in fine large haddock. Some cusk and ugly looking catfish with long feline teeth and dragon-like heads were brought in, also a few halibut, one of 100 pounds, pollock and codfish.

On this cruise a comprehensive collection of rocks hauled up with the marine growth attached was gathered. There were long-stemmed stone lilies, crinoids, which the fishermen called " lemons," soft sea slugs or holothurians they called " pumpkins," a yellow growth termed " corn," sponges, and a large variety of other marine life. The rocks of Browns Bank were of similar character to those of Georges Bank, though seemingly of greater variety, somewhat smooth and rounded, but subangular. Quartz and quartzite predominated both in sand and pebbles. Slates, granites, diorites, schists, sandstones, similar to the variety usually found in glacial deposits on the neighboring shore, were abundant, testifying to the glacial origin of these sea banks.


MAP OF
THE CONTINENTAL SHELF
BETWEEN NEW YORK AND HALIFAX
SHOWING
THE FISHING BANKS
THE TERMINAL MORAINE
AND
THE SUBMERGED VALLEY OF THE HUDSON
Mecator's Projection
Equatorial Scale 1:6 500 000
Mean Meridional Scale 1:4 700 000
terminal moraine
isobaths in fathoms
75° W
70°
45° N
40°
Portland
Boston
Cape Cod
GULF
THE CHANNEL
NANTUCKET SHOALS
Block Is.
No Mans Ld.
Martha's Vineyard
Nantucket
Fishing Rip
25 fathoms
50 fathoms
100 fathoms
500 fathoms
1000 fathoms
BANK


65°
45°
Halifax
MAINE
Sable I.
SABLE BANK
LA HAVE BANK
BROWNS BANK
BANK
50
100
1000
3000

The formation of these fishing shoals indicates that it will be useless to look for new banks south of the glaciated area, or about north latitude 40°. Soundings on the continental shelf north of this parallel are now complete enough to assure us that no new banks of any considerable extent will be discovered. The need of saving for the future this vast source of wealth, which, unlike our mineral resources, is self-perpetuating if properly conserved, more firmly impresses itself when it is thus seen how limited is the distribution of these specially adapted formations. They are far enough from shore to prevent the smothering by fine coastal sediments of the multitudinous marine life, which here finds a pebbly bottom, cleaned by strong tides on which it can attach itself and grow, a most prolific sort of feeding ground for the great schools of our finest food fishes.

It seems desirable that some action should be taken to protect the fish during the spawning season, at least for a period of years. There is also the greater danger that the now wholesale and destructive method of fishing with the steam trawler may cause irreparable and permanent damage to these natural beds. This method, which has already played great havoc with the fishing grounds of the European coasts, so that vessels which once operated about the British Isles must go as far as Iceland on the north and Portugal on the south for their catches, is at present being attempted in this country, and a gradually increasing fleet of steam otter trawlers is now plying between the banks and the Boston market.

The beam trawler tows over the bottom a great open net which scours the ground like a great harrow and engulfs nearly everything, big and little, with which it comes into contact. Not only does it disturb and destroy the delicate growths and fish food of the bottom, but vast quantities of small and unmarketable fish besides, which are crowded into the great maw of the open net and either smothered or killed when dumped on deck.

These trawls are ceaseless in their destruction, for they are towed under nearly all conditions at night as well as day, while the line fishermen must wait for moderate weather. They also pick up, without discrimination, the sick and spawning fish which will not bite the baited hooks. This method of fishing tends to create a monopoly, as the costly steam vessels require large capital to build and operate and their increase will naturally tend to drive out the hardy independent men of modest means who are to-day engaged in line fishing on the small schooners. These line fishermen are undoubtedly the best sailors we have; they are resourceful, brave and efficient, largely because they all, crew, cook and skipper, are either

owners or share in every fare of fish. In time of war they form our greatest source for first-class seamen. The beam trawler is operated by nondescript "steamboat sailors off the street" and controlled by interests who need never go near the sea.

To judge the urgent need of restricting steam trawling fishing on this continent—for the fishing banks are an essential part of the shallow coastal shelf and should be regarded as part of the natural continent—we have but to glance at the present situation in Europe where beam trawl fishing has nearly put an end to the earlier methods, and where much legislation has already been passed to restrict this destructive means, though not until the adjacent supply of market fish was reduced to 25 per cent of what it was some 15 years ago and it became necessary to go four times the former distance for fish. A large number of small English and Scotch fishing towns have been obliged to give up the fish business, as Whitley, Scarboro, Stalhier, Bradlington. The once rich Dogger Bank fishing has been, as a profitable industry, destroyed, and fish of the market size to which we are accustomed have practically disappeared in nearby English waters. Among 70 Billingsgate dealers recently only one had fish of market size, these consisting of three boxes of Iceland cod and haddock. The European consumers are obliged to eat skate, ling, catfish and other "culch" which Americans do not use.

Nature has so arranged limited areas off our coast that they are veritable mines of self-perpetuating wealth and inexpensive food for the people. Shall we, regardless of the overseas disaster already wrought, run the risk of losing one of the remaining natural sources of food supply which with judicious use may doubtless be saved for the future?

THE GERMAN ANTARCTIC EXPEDITION*

The *Deutschland* sailed south on Dec. 11, 1911, from the harbor of Grytviken, South Georgia. On Dec. 14, in 57° 10′ S. and 32° 56′ W., the first ice was encountered but progress was hardly impeded till Dec. 17, in 61° 2′ S. and 31° 57′ W., when the ship was held fast in heavy pack ice. Between this date and Dec. 31 only thirty-one nautical miles were covered. From Jan. 1, 1912, to Jan. 6, under varying ice conditions, the ship had to force its way through pressure ridges and was finally held fast in the pack from Jan. 6 to Jan. 10 in 63° 47′ S. and 28° 9′ W.

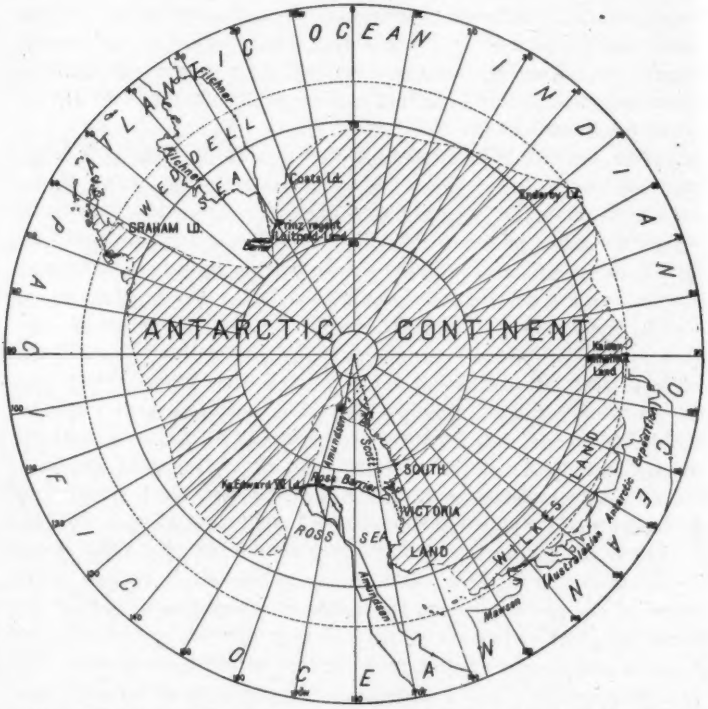
After Jan. 10, however, we had a clear way, finding leads to the south and southeast in which we advanced as far as 70° 47′ S. and 26° 38′ W. (Jan. 14). Here heavy pack ice again held us back. We feared we might be forced to winter in this low latitude, and Captain Vahsel thought of steering east or southeast to be nearer land; but, on Jan. 24, the ice suddenly opened and on we went south.

Three days later, on Jan. 27, we had the first intimation of land; blue ooze was obtained from a depth of 3,432 meters (11,256 feet), while earlier, after crossing the rise of a little over 1,000 meters (3,300 feet) below sea level between the Sandwich group and the South Orkney Islands in latitude 60° to 61° S., the ship was constantly over depths of 4,000 to 5,000 meters (13,120 to 16,400 feet). On the following day, in 73° 26′ S. and 30° 14′ W., the soundings decreased rapidly to 600 to 800 meters (1,960 to 2,600 feet). The land we had been looking for through more than 1,000 nautical miles of ice, could not be far away; but, to our astonishment, on Jan. 29 we observed a slight swell from the southeast which meant that ice-free water lay to the south. On the following day we passed a line of icebergs and compact heavy pack ice that would have prevented us from keeping on a southerly course. It seemed as if the south and southwest winds had pushed this ice against the land. As snow was falling and the weather was thick, Captain Vahsel preferred to turn to the east under slow steam and wait for clearer weather.

In the afternoon, when the weather cleared, in 76° 48′ S. and 30° 25′ W., we saw inland ice which rose gradually to a height of

*Report of progress after the departure from South Georgia. Submitted on behalf of Wilhelm Filchner, Director of the Expedition, by Dr. Erich Przybyllok, in charge of researches in terrestrial magnetism. Translated and condensed from the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1913, No. 1, pp. 1–17.

200 to 300 meters (650 to 980 feet) and broke off abruptly to the sea in a vertical wall twenty to thirty meters (65 to 100 feet) high. Under this immense mass of ice land undoubtedly lay hidden, the ice-covered Antarctic Continent. Nothing else was visible but this ice shield shining in the sun, an indescribably monotonous picture, and yet how many gazed at it with straining eyes, for they believed they were no longer far from their goal. But landing on the ice



Map of the Antarctic Showing the Routes of the Amundsen, Scott, Mawson and Filchner Expeditions. Scale, 1 : 60,000,000.

wall, which was twenty to thirty meters high, seemed very difficult if not impossible. So the ship steamed along to find a good place to land. The position of the ice coast was determined by continuous compass measurements.

On Jan. 31 we reached a small bay in 77° 48′ S. and 34° 39′ W. It was named Vahsel Bay. Here a low mass of ice (barrier ice),

about eight to thirty meters (26 to 98 feet) high, meets the edge of the inland ice. Between this lower ice and the inland ice lies the bay. The lower ice was divided by numerous leads frozen over. Along its border some icebergs had been cemented to it by sea ice. The fact was determined that the submarine ridge, which we had followed to the southwest and the south along the edge of the inland ice, rises at Vahsel Bay to about 800 to 1,000 meters (2,600 to 3,300 feet). This ridge, which is rounded in form, continues to the south, leaving the lower ice mass to the west. To the south of Vahsel Bay three nunataks in the land ice, proved conclusively that a new land lies under the immense mass of the inland ice. The barrier ice mass to the west of Vahsel Bay continues beyond the reach of vision to the southwest and west, evidently maintaining its level character. It, too, like the inland ice, falls off to the sea in a vertical wall ten to twenty-five meters (33 to 82 feet) high. It seems to be an ice barrier similar to that in the Ross Sea.

The Director landed two parties in Vahsel Bay to seek a suitable place for a winter station. They reported that the ascent of the inland ice and of the barrier ice was possible. The Director, however, decided that the main object was to determine, by sledge trips, the penetration of this ice barrier toward the interior of the Continent and, if possible, to connect with Shackleton's explorations on the Ross Barrier and the plateau adjoining it on the south. To determine positively that this phenomenon was an ice barrier the Director proposed to continue to take the ship along the barrier to the west, surveying its course. If a more favorable location for wintering should be found, Vahsel Bay was to be given up; if not, the expedition was to return to the bay. In spite of Capt. Vahsel's fear that the ship might be stopped by ice on its trip west, so that return to the bay would be impossible, the Director began the trip. At midnight a sounding in 77° 45′ S. gave 620 meters (2,034 feet) near the barrier. Conditions were thus seen to be similar to those of Ross Barrier, confirming the idea that this is really an ice barrier similar to that in Ross Sea.

On Feb. 1, the ship met heavy masses of pack ice in front of the barrier but the ship was kept on her course west-northwest and northwest through the ice till 9 A. M. On Feb. 2, when our position was 77° 12′ S. and 39° 5′ W. a sounding gave 700 meters (2,300 feet). To the west and northwest the ice blink continued, nor was there any reflection of water to be seen on the sky. Under these circumstances the Director, in agreement with Capt. Vahsel, decided to return to Vahsel Bay and establish winter quarters thereabouts. The

Director was led to this decision because, in all probability, the ice barrier continues in an increasingly northerly direction the farther west one goes. The ice blink to the west and northwest seemed to indicate this. To push northwest through the heavy pack along the edge of the ice barrier was impossible. The *Deutschland* had evidently reached the most southerly point of the barrier in Vahsel Bay. This bay seemed feasible for landing, and Capt. Vahsel considered it suitable. Then, too, land had been sighted there, and the proximity of the barrier ice would make it easier to explore by sledge the region between East and West Antarctica.

So the ship was turned back, and, on Feb. 2 and 3, the region of the bay was examined. The newly discovered land was named Prinzregent Luitpold Land. It was found that the ice mass to the west of Vahsel Bay was separated both from the ice barrier on the west and the inland ice on the east by leads, frozen over at the time, so that it was drift ice with no connection that could be crossed, either with the inland ice or with the ice barrier. Thus Vahsel Bay did not seem a very favorable place for the establishment of winter quarters. Capt. Vahsel also believed that landing on the ice barrier, because of the pressure of the advancing pack ice, was no more feasible than landing on the inland ice, where the ship would be endangered by falling ice masses. He had no fears for the *Deutschland* if she remained in Vahsel Bay, as the ship could here be protected from ice pressure. A winter station therefore seemed possible only on the drift ice. Under these circumstances the ship could not have returned, as she would have to remain in Vahsel Bay.

On Feb. 3, dark sky (the reflection of water) became visible to the west and northwest, and as far as one could see the sea was ice-free. The Director decided again to sail to the west along the ice barrier, to discover, if possible, a more suitable landing place. He was aware that on this trip the ship might risk being cut off from Vahsel Bay by pack ice, but he was willing to run this risk as the journey might result in finding a better landing place.

So the ship set sail west again. To the west of Vahsel Bay the sea was almost ice-free; but in the night of Feb. 3–4 much pack ice and numerous icebergs were passed. On Feb. 4, the ship's course followed large leads. The noon position was 76° 57′ S. and 40° 54′ W. The edge of the ice barrier which the ship had followed now disappeared from sight. A brisk north wind was pushing much ice against the barrier and the position of the ship was less favorable than on Feb. 1; so Dr. Filchner ordered a return to Vahsel Bay, which was immediately carried out.

This second advance to the west seems to show that the current which carries the ice to the southwest and south along Coats Land and Luitpold Land and then west along the barrier, probably bends around to the north along the coast of Graham Land. It seems probable that this current causes a great accumulation of ice near the western part of the barrier and Graham Land. As it was early in February that these great quantities of ice were met, the chances for a ship to penetrate to the west were remote. The exploration of the barrier seems possible only by sledge expeditions.

On Feb. 5, the ship again arrived at Vahsel Bay. The erection of the winter station at once demanded all our attention. It was decided to place the camp on the flat surface of an iceberg attached to the ice mass within easy reach of the ship and also of the inland ice. On Feb. 8, the timber for the house, and all the animals, provisions and tents for a working staff of six men were landed. On Feb. 11 and 13, coal and other material were landed. The work was delayed, however, by repeated storms; and on Feb. 18 the iceberg broke loose and began to drift. The task of saving the material was at once begun, and nearly everything was returned to the ship.

The party did not yet despair of establishing a winter station on the inland ice. On Feb. 25, a lot of supplies were taken to the inland ice and placed 200 meters above sea level. On Feb. 28, another depot was erected and Dr. Brennecke and Dr. Heim were landed with their equipment to engage in scientific work. The depot was about 600 meters from the edge of the inland ice and two kilometers to the north of the first depot. It contained about 1,000 kilograms of provisions. In order to lift the boxes easily to the inland ice, Kling had rigged pulleys, and one box after another was thus hauled out of the boat. The edge of the inland ice at this place was eight to ten meters above the sea.

By March 2, however, Captain Vahsel considered the position of the ship dangerous and he favored taking her as soon as possible to the open sea. Director Filchner finally decided to return north to winter in South Georgia and attempt another landing in 1913.

On the morning of March 4 we accordingly began the return with heavy hearts. We found open water, occasionally streaked with new ice. The course led along the coast of the new found land. From March 5, new ice constantly impeded our progress, and so the course was directed more to the north. Although the ship sailed on March 6 under full steam and, at times, with all sails set, only three miles were covered. On March 7 we dynamited the ice without much

success. On the following night the first ice pressure occurred. So the struggle went on. By April 17 we were held fast in the midst of old floes in 72° 24′ S. and 40° 12′ W. We had resigned ourselves to drifting, a condition we had tried to avoid, and we now devoted our attention to scientific work.

A hole was kept open in the ice near the ship to observe the growth of the ice and similar phenomena. Over a second hole a tripod was erected where soundings were made, temperatures observed at various depths, samples of water procured, and current measurements taken and specimens of the fauna procured with the plankton net. The meteorological station was established on the ice and ground thermometers set up in it. A series of resistance thermometers were also used to determine the temperature of the ice and air at different heights. A storage house was built for the kites and captive balloons. Almost daily observations, with self-registering instruments, were made of the upper air currents, and very high altitudes were attained. The magnetic observatories were erected early in April. The whole region is magnetically extremely quiescent, due to a relatively low inclination for so high a latitude. There was only meager occurrence of *auroræ australes*. We observed a few of them but they were weak, generally a pale, flat arc over the southern horizon from which rays shot out. Only once did we see the drapery effect. We, however, observed frequent and multiform meteorological and optical phenomena, such as light columns, rings, dog-suns, as well as a phenomenon not hitherto observed, a column of light, vertical to the horizon and situated in the meridian opposite to the sun.

Sub-antarctic birds prevailed in the lower latitudes; of strictly Antarctic birds we only met the Adélie penguin (a few specimens); the Emperor penguin we met with frequently but never in large numbers—the largest flock may have numbered twelve specimens. *Pagodroma* and *Thalassoeca* were the only inhabitants of the air that we saw and we met a few of them during the whole winter. Whales were seen in the leads as far south as we went. Of Antarctic seals only a few specimens of the sea leopard, Ross's seal and the Weddell seal were secured. The crab-eater occurred very frequently on the whole trip; we hunted it where we could as it furnished meat for the dogs and ourselves. Thanks to our excellent cook, this meat, prepared in different ways, was excellent in flavor. It was much preferred to canned meats; the liver was considered a particular delicacy.

From June 23 to 30 the Director, with Dr. König and Kling,

undertook an expedition with dog sleds to the land alleged to have been found by Morell. The non-existence of this land was proven.

During the drift we suffered a severe loss in the death of Capt. Richard Vahsel. On the trip out to Buenos Aires in 1911, Capt. Vahsel had already complained of symptoms which he thought to be rheumatic. Unfortunately his condition did not improve in the severe Antarctic climate. At the beginning of the winter night (middle of May), Capt. Vahsel began to feel ill; an old heart trouble reappeared which made him take to his bed. His condition became continually worse until his death on Aug. 8. On Aug. 10, his body had a seaman's burial, just at the Antarctic Circle, which he had crossed twice, and beyond which he had sailed the ship three degrees farther south than any one before in that region. The Director appointed First Officer Lorenzen to his place.

The ship was frozen fast in the ice on May 6, 1912, and then began its drift. The Weddell Sea is the seat of a barometric minimum of about 735 millimeters. Under the influence of this cyclone, into which the winds blow, a circular system of air currents develops which coincides roughly with the edge of the land, so that the winds blow toward the south and southwest along the coast of Coats Land and Prinzregent Luitpold Land, toward the west and northwest along the barrier, and toward the north and northeast along Graham Land. The ice fields follow these air currents, although they are sometimes pushed slightly out of the general direction. They respond quickly, however, to temporary changes in the wind direction, so that the direction of the drift always corresponds to the direction of the wind. It seems that when the barometric minimum increases in intensity the winds drive the ice fields toward the nucleus of the depression and thus cause dangerous ice pressures. When the minimum decreases the ice fields tend to separate and thus give the ice more freedom of motion. Thus we met with open water in the south where sea winds predominate. This was also the experience of Weddell.

Our drift led us first to the west-northwest, until May 7, in 72° S. and 42° W. Then it turned to the north and maintained this direction until the beginning of October, when we reached 65° S. and 42° W. From this time the drift was more irregular but in general toward the northeast. At the beginning of September the proximity of the open sea became noticeable; the registrations of the magnetic balance showed the presence of a ground swell; the ice opened up near the ship and large leads were formed. In September heavy ice pressure occurred in front of the ship but did not

quite reach the vessel. When the ice broke up again a large lead, nearly 100 meters wide opened and into it the bow of the ship projected. Although subsequently this lead became covered with ice it later gave us a chance to escape from the ice without difficulty, as the lead was connected with another large lead. By the middle of November, the melting of the ice on its under side had progressed so far and the ice was so soft that it was decided to free the ship. For this purpose a channel was easily dynamited to the second lead and on Nov. 26 we freed the ship under steam.

The large number of icebergs, which became more frequent as we advanced north, was noteworthy. Sometimes 200 bergs were in sight; we also met them in great numbers in the open sea; indeed, the southern coast of South Georgia was literally blocked by the ruins of icebergs with their well-known fantastic forms, due to melting.

On Dec. 19 we reached South Georgia. From here the members who did not wish to join the next voyage of the expedition started on their return to Germany. An immediate return to the south could not be undertaken mainly because the rudder, which had been damaged, had to be exchanged for a new one before undertaking another long ice voyage and because other repairs to the ship required a dry dock. The hull of the ship was intact.

The *Deutschland,* therefore, went on to Buenos Aires while the members who had withdrawn followed on the transport *Harpon.* In Buenos Aires, Dr. Filchner placed the ship at the disposal of the Argentine Government to relieve the members of the Oficina Meteorologica Argentina in South Georgia.

The *Deutschland* will leave there the entire material and the animals. All the provisions will be deposited there too, in order to avoid being spoiled by the warm climate of Buenos Aires. From South Georgia the ship is to sound the Dincklage Bank. About May the *Deutschland* will reach Buenos Aires and then go into dry dock in order to carry out a trip to the Sandwich Islands southeast of South Georgia, during the current year. At the end of the year the second trip to the newly discovered land can be made again and the explorations in the Antarctic continued according to the original program.

RAILROAD ROUTES IN ALASKA

The report of the Alaska Railroad Commission, published as House Document No. 1346, 1913, supplies trustworthy knowledge of the actual conditions and resources that have to do with the possibility of railroad development in the Territory. The Commission, appointed by President Taft by authority of an act of Congress approved on Aug. 24, 1912, consisted of Major Jay J. Morrow, Corps of Engineers, U. S. A., Chairman; Alfred H. Brooks, geologist in charge of Division of Alaska Mineral Resources, Geological Survey, Vice-Chairman; Civil Engineer Leonard M. Cox, U. S. Navy, and Colin M. Ingersoll, consulting railroad engineer, New York City. Its main object was to examine and report on the most advisable railroad routes in the Territory.

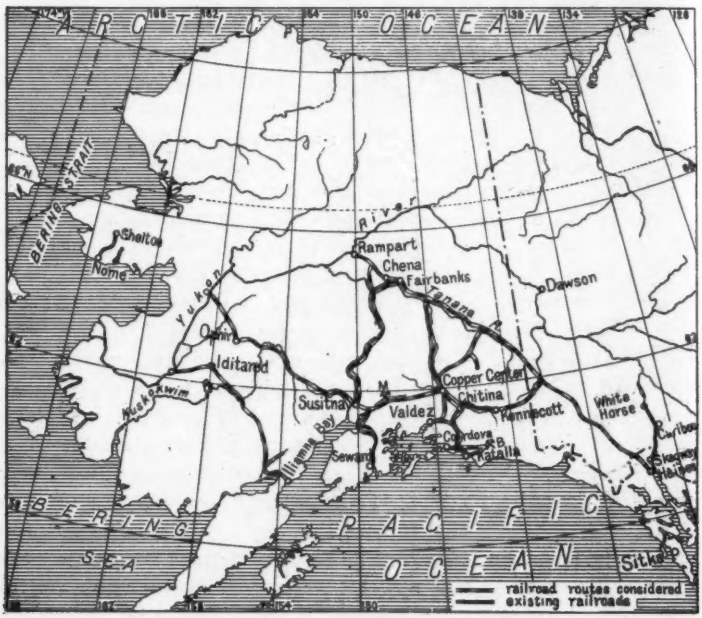
Railroad construction in Alaska depends upon the resources of the Territory, the possibility of settlement and the topography of the country. The existence of large undeveloped mineral resources as well as extensive tracts of agricultural and grazing lands is now a matter of common knowledge. It has also been shown that climatic conditions throughout the larger part of the Territory permit settlement. The possibility of utilizing the natural resources distributed in the economic districts by means of railroads connecting tidewater with the well-developed Alaskan river systems was likewise recognized. The 5,000 miles of navigable waters of the Yukon and Kuskokwim rivers, in particular, drain a large inland basin which might be advantageously penetrated by means of a line from southern Alaska.

From the standpoint of human settlement the Territory may be divided into a northern and southern region, which are fairly accurately delimited by the Arctic Circle. The popular conception of bleakness and of frozen solitude belongs, properly speaking, only to the region north of the Endicott Range, which is north of the Arctic Circle. The southern region is quite susceptible of becoming a profitable field for human activity.

Alaska's southern coast is separated from the central districts by the Pacific coastal ranges which front the sea in the shape of a large arc extending from British Columbia to the end of the Alaskan Peninsula. The system attains a maximum width of 200 miles north of Prince William Sound. Access to the two great

inland valleys of the Yukon and the Kuskokwim is, therefore, gained with difficulty along the few passes leading north and northwest from the ocean.

Transportation of ocean-borne goods up the Yukon and Kuskokwim is limited to three or three and a half summer months. The climatic conditions, therefore, constitute a serious drawback to commerce depending on the navigability of these water courses. Moreover both flow into Bering Sea and their mouths lie some 2,500 miles distant from Puget Sound. The approach to both



Railroad Routes in Alaska. Scale, 1 : 19,000,000.

rivers is difficult. That of the Yukon is a shifting channel of little depth across mud flats. The entrance of the Kuskokwim is very tortuous. Nevertheless the river system constitutes at present the best developed transportation route. The Yukon is navigable throughout central Alaska and beyond the Canadian frontier as far as White Horse, a distance of 2,200 miles. Its tributary, the Tanana, is navigable as far as Chena, near Fairbanks. The lesser

valleys of the Copper and Susitna are also navigable. The importance of these two valleys however consists in thus providing suitable grades for tracks leading to the regions north of the mountainous barrier overhanging the southern coast.

Five natural passages lead from the ice-free ports to the valleys north of this rocky barrier. The most westerly of these routes is based upon Pyramid Harbor, an arm of Lynn Canal, or Haines, a bay on the west side of Lynn Canal. The road follows the valley of the Chilkat River and extends into a series of natural depressions paralleling the inland front of the St. Elias Range. Thence it would follow, if built, the broad flat divide between the White and Tanana basins to attain Fairbanks. This is the longest of the routes considered.

Another available pass is based on Yakutat Bay. The road would run southeasterly for about 50 miles to the mouth of the Alsek River and ascend the Alsek Valley, where a junction with the Pyramid Harbor-Tanana route may be effected at about 700 miles from the coast. In point of natural resources, harbor conveniences or topographic obstacles to construction, this road cannot stand comparison with the first.

Farther west, the next route of access to the interior is afforded by the great Copper River Valley. Here three general routes can be utilized. One from Cordova or Katalla directly up the river; a second from Valdez across Marshall Pass and down the Tasnuna to the Copper River Valley; a third from Valdez over Thompson Pass to the Copper River at a point near Copper Center. All three follow practically the same line from Copper Center up the Gulkana River and one of its tributaries across the divide to the headwaters of the Delta River and down that stream and the Tanana River to Fairbanks.

A fourth line can be run northward from Seward, in Resurrection Bay. A road has already been begun at this point and extends as far as Turnagain Arm, a branch of Cook Inlet. This road can be prolonged to the Copper River plateau by following up Knik Arm and the Matanuska Valley over Tahneta Pass at an elevation of about 3,000 feet and so reach the Copper River at a point near Copper Center. The Tanana River Valley could be reached by the extension of the line or by the Susitna River. The advantage of this road lies in the promise of connection with the great Kuskokwim Basin through one of the passes leading from the headwaters of the Yentna, a tributary of the Susitna.

A westernmost line could have a terminal point at Iliamna Bay and extend thence into the Kuskokwim, and from that valley it might be made to attain the lower Yukon, from which it is separated only by a low watershed.

On the basis of physical and economic considerations the Commission finds that the most favorable system may be provided by the construction of two independent roads that may later be connected or extended according to new requirements. One of these lines should connect the valley of the Yukon and its tributary, the Tanana, with tidewater, while the other should be devoted to the development and needs of the Kuskokwim and the Susitna.

In the opinion of the Commission the best route for the first system is that which leads from Cordova by way of Chitina to Fairbanks. The Bering coal field should be connected with the system, *via* Lake Charlotte, by a branch 38 miles long. The reasons why the best trunk line would thus be supplied to the Yukon and Tanana rivers are that Cordova can be made into an excellent harbor, that it is the best ocean terminal for the Bering River coal, that the route is the shortest and finally that the easier grades over it would result in the lowest freight rates into the Tanana Valley. A railroad from Chitina to Fairbanks, it is estimated, will be 313 miles long.

The second system should lead from Seward around Cook Inlet to the Iditarod. It should be connected with the Matanuska coal field. It is pointed out that it would not be economical to haul the output of this district to Valdez or Cordova and that the field's logical outlet is, therefore, Seward. This route is deemed to be as imperative as the first, because the latter fails to provide access to either the Matanuska coal field, the fertile land and mineral wealth of the lower Susitna or the great Kuskokwim Basin.

The route from one of the harbors on Cook Inlet into the valley of the Kuskokwim was also considered. No railroad based on any of them will assist in the development of the Territory so efficiently and economically as can be done by lines reaching the coast farther north or east. The Commission says, however, that Iliamna Bay or Iniskin Bay have possibilities as a terminal for a short line intended to develop the resources and industries of the immediately tributary region.

The railroads thus recommended will involve 733 miles of new construction at a cost of $35,000,000. It is expected that sooner or later both systems will be tied together by several local branch

lines and that the same network will eventually reach every valuable portion of the Territory.[1]

MEDICAL SCIENCE AND THE TROPICS

Sir Ronald Ross, to whom it is due, perhaps, more than to any other man that the fame of British tropical schools and of British discoveries in tropical medicine has spread over the world, read a paper with this title at the meeting of the Royal Colonial Institute in London on Jan. 14 last. The paper appears in *United Empire* (Feb., 1913, pp. 120–131) and from it are condensed here some of the statements of this distinguished physician.

Sir Ronald Ross said that those who have not been in tropical countries can scarcely conceive the former conditions of life of the poorer Europeans there, nor imagine what the first pioneers must have suffered. With only poor huts to live in, nothing but the poorest food to eat and surrounded by innumerable insect-carriers of infection, they lived a most dangerous life. The risks of death from tropical diseases were immense. Whole regiments used to be wiped out by yellow fever in the West Indies and by cholera in India. No young man visiting tropical America or Africa could be reasonably certain of life. But European settlements did endure though they were only poor and ramshackle affairs. Vast areas, however, remained almost untouched except by occasional explor-

[1] The following table is taken from the Commission's Report and gives in concise form the data as to mileage, terminals and gauge of existing railroads in Alaska:

Southeastern Alaska:	
White Pass and Yukon route, Skagway to White Pass (narrow gauge). Terminal at White Horse, Yukon Territory—total mileage, 102 miles	20.4
Yakutat Southern Railroad, Yakutat to Situk River (narrow gauge)	9.0
Copper River: Copper River & Northwestern Railroad, Cordova to Kennicott (standard gauge)	195.0
(The same company has built a few miles of track at Katalla, where the Alaska Pacific Railroad & Terminal Co. has also done some work. At Valdez a few miles of track of the Alaska Home Railroad were laid in 1907, and some work was previously done on the Copper River & Northwestern Railway and on the Valdez & Yukon Railroad.)	
Kenai Peninsula: Alaska Northern Railroad, Seward to a point near head of Turnagain Arm (standard gauge)	71.6
Yukon Basin: Tanana Valley Railroad, Fairbanks and Chena to Chatanika (narrow gauge)	46.0
Seward Peninsula:	
Seward Peninsula Railroad, Nome to Shelton (narrow gauge)	80.0
Paystreak Branch, Seward Peninsula Railroad (narrow gauge)	6.5
Council City & Solomon River Railroad, Council City to Penelope Creek (standard gauge)	32.5
Wild Goose Railroad, Council to Ophir Creek (narrow gauge)	5.0
	466.0

ers. Civilization was repulsed throughout tropical Africa and this phenomenon was chiefly due to the great tropical diseases of the continent.

These diseases are almost as disastrous to the natives as to the immigrant Europeans. Their influence is to reduce the number of natives to so low a figure that the survivors can subsist only in a barbaric state. To believe, one has to see a village in Africa or India full of malaria or sleeping sickness or a town under the pestilence of cholera or plague. Malaria often affects every child, probably kills a large proportion of new-born infants and renders the survivors ill for years. All white visitors to tropical America were almost certain to be attacked by yellow fever and the chances of death were one to four. Perhaps the greatest enemy of all was dysentery, which, in the old days, slaughtered thousands of white men and millions of natives of India, America and all hot countries. Malaria has always been the bane of Africa and India; the Bilharzia parasite of Egypt; and we are acquainted with the ravages of Kala-azar and sleeping sickness. Apart from these more fatal maladies, life is rendered unhealthy by other parasites and by innumerable small maladies such as dengue and sand-fly fever, filariasis, tropical skin diseases and other maladies. While in England the annual death rate is below 20 per 1,000, throughout the tropics it is nearer 40 per 1,000. In India alone, malaria kills over 1,000,000 persons a year and dysentery kills many hundreds of thousands. There are places in which the ordinary death rate is between 50 and 60 per 1,000 and other places so unhealthful that their inhabitants desert them.

But tropical medicine and bacteriology are doing away with these horrors. The seeds of tropical medicine were really contained in the works of parasitologists laboring in Italy and Germany during the past three centuries—often laboring entirely unknown to the public. Studying the larger parasites of man and animals they were gradually led to that remarkable law according to which many parasites are transferred from one individual to another by the agency of intermediary hosts. Our recent advance regarding the route of infection in the great tropical diseases has largely been merely an extension of this law. The whole history of the subject is fascinating to the man of science, though it has never yet been written. We see on the one hand the pioneer labors of these European workers, and on the other hand the pioneer labors of hundreds of medical men serving in the tropics who for some centuries described and differentiated the diseases which they

were called upon to treat. Gradually the two streams of investigation coalesced with the result that the diseases differentiated by the doctors were explained by the researches of the parasitologists. The culminating period of advance has been within the last thirty years.

Malaria has been shown to be due to a minute animal parasite which is conveyed from man to man by Anopheline mosquitos. Filariasis has been shown to be carried by another group of mosquitos; while yellow fever and dengue, though their actual cause has not yet been certainly ascertained, have been proved to be communicable by a third group of these insects. Sleeping sickness is caused by other species of parasites, and is carried by a species of tsetse-flies. Dysentery has been shown to be of two kinds—a bacillary and an amœbic dysentery. The group of relapsing fevers has been shown to be caused by a third group of parasites, and often to be carried by ticks. The bacillary causes of cholera, Mediterranean fever, and plague have been definitely ascertained, and the great discoveries have been made that the last is communicated by the rat flea, and that Mediterranean fever is communicated by goat's milk. Yet another group of parasites causes the deadly kala-azar of India, and the famous Aleppo boil of Persia. Every year sees fresh advances; but, still more, our methods of diagnosis have now been rendered so precise that many of these diseases are being found where previously they were not known to exist—for instance, kala-azar in Algeria and Italy, and Mediterranean fever in many parts of the world. At the same time invaluable discoveries have been made regarding non-parasitic diseases, such as beri-beri, which has been shown to be due to the absence of some chemical element in the food, and which is essential to the nervous system; while, lastly, numerous and patient researches are now being made as to the whole theory of immunity in these diseases and the best method of cure. Is not all this knowledge a great gift to the human race?

Sir Ronald Ross mentions a number of places in the tropics where health has been vastly improved within the last few years. Up to 1902 the small town of Ismailia near the Suez Canal was almost paralyzed by malaria, more than 1,000 cases occurring annually in the small population. In that year, active steps were taken against the disease in the light of the new knowledge with the result that malaria has been absolutely and permanently banished from the place. The results were scarcely less brilliant in certain towns in the Federated Malay States which were completely rid of the incubus from which they had suffered so much. When Sir

Ronald Ross was at Panama in 1904 the British Consul told him that while the French were attempting to dig the Canal they lost at least 50,000 lives from the prevalent diseases, chiefly malaria and yellow fever. We know now that the death rate in the Canal Zone has actually been reduced below that of many of the United States. Many who have visited the Isthmus have testified to the wonderful transformation. Dr. David Thompson wrote to Sir Ronald from the hospital at Ancon, the capital of the Canal Zone, that the sanitary work consisted simply of carrying out the principles Sir Ronald had laid down—screening houses, draining ditches and streams, treating large patches of water with larvicide and petroleum. The work is carried on constantly all along the line of the Canal. The effect has been marvellous. In Ancon there are no mosquitos and they are exceptionally scarce everywhere. Malaria is now nearly a thing of the past. Mild cases only occur and they are nearly all cases of relapse due to insufficient quinine treatment. "With regard to the climate here it is, in my opinion, much less dangerous than the English winter. Yellow fever and malaria are practically eliminated."

When Sir Ronald was in the Island of Mauritius in 1908 malaria was making terrible havoc in a large village and among British troops living in barracks near by. The neighboring marsh was completely drained at a cost of $10,000 and the result has been the complete extermination of the disease. Mediterranean fever among the troops and sailors in Malta and among peasantry in parts of southern France has been exterminated. Sleeping sickness in Uganda has been reduced. Instance of small campaigns might be multiplied by the score. The vital statistics of non-native officials in West Africa for 1911 show that the total death rate has fallen wonderfully from 1903 to 1911, while the custom of invaliding white men home has practically ceased.

Such facts mean civilization and prosperity for vast possessions in the tropics; and the brilliant results thus far attained are only stimulating further study. Sanitation is no longer relegated to the last position in public affairs. Congresses and conferences are held; commissions of inquiry are appointed; investigations are carried out; and more adequate funds are given. The end will be one of the greatest triumphs of human science. A poet who was much despised in his time, namely Martin Tupper, wrote a magnificent line about Columbus, in which he said that "He gave to man the god-like gift of half a world." Perhaps a day will come when the same thing will be said of tropical medical science.

CORRESPONDENCE

CLIMATIC CHANGES.

To the American Geographical Society:

In my article on climatic changes,* Professor Huntington's reconstruction of oriental history was confronted with the facts and was shown to be in almost every detail unwarranted, a conclusion with which every orientalist to whom I have sent reprints has agreed. In his reply, Professor Huntington has made almost no attempt to argue away these facts. Further comment would be unnecessary had he not made certain accusations which demand an answer.[1]

As a student of history, I had no opinion on the general theory, though so far from "attacking" it, I said "There may have been such fluctuations as the theory demands." I am not "possessed of a moderate knowledge of climatology" though I believe I have read everything of Professor Huntington's from the *Zeitschrift für Ethnologie* to *Harper's*. When, however, he attempts to explain details in oriental history, it is not only my right but my duty to test such application. This was done in my article and it was because his misuse of historical data threw grave suspicion on the theory that it was presented to geographers. Yet even if his California data prove the general theory. this cannot change the fact that his reconstruction of oriental history is entirely false.

Much of his error is due to the use of antiquated secondary works, it would seem, for Professor Huntington gives no references for his statements. His failure to verify sources is shown in a glaring manner by his attempt to turn my incidental reference to the Lucian road against me. Had he verified it, easily found in the Fowler translation, III. 220, he would have read the following:

"Alexander . . . was lord of Persia; his orders had to be conveyed to every part of his empire by dispatch runners. Now from Persia to Egypt was a long journey; to make the necessary circuit round the mountains, traverse a *great desert*, and so finally reach Egypt, took at the best full twenty days. . . . A Sidonian trader came to him and offered to shorten the distance: if a man cut straight across the mountains, which could be done in three days, he would be in Egypt without more ado. This was a fact; but Alexander took the man for an impostor . . . A trial will soon show you that you may fly over the mountains from Persia to Egypt, and in a day, in part of a day, take rank as rhetorician."

It is clear that Lucian is not referring to conditions of his own day but to those of *five centuries* before. Had Professor Huntington verified this passage, whose highly rhetorical tone made me uncertain as to whether the desert road was any more a "fact" than the "fact" of the three days road from Persia to Egypt, he would hardly have used it to prove climatic conditions in Lucian's time.

His statement that I "attempt to prove" that there was no road across the desert in pre-Hellenistic times shows a strange inability to understand on whom

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* *Bulletin*, Vol. 44, 1912, pp. 432–447.

[1] This note, in somewhat longer form, was sent to the *Bulletin* immediately after the publication of the original discussion. Pressure of space has delayed its publication. Meanwhile, Professor Huntington has published an article in the American Historical Review in which, while quoting *in extenso* from an article of mine in a journal devoted to geography in the secondary schools, he has ignored my serious criticism which had appeared six months before in the *Bulletin*.

falls the burden of proof. Out of hundreds of references to east and west roads, it is unthinkable that we should have none to a desert one did such a one exist. Until he can show at least one such reference *in the sources*, the argument from silence absolutely prohibits the hypothesis of a desert road.

As to the "unproved statement" in regard to the present day post road across the desert, my authority was Consul Magelssen, confirmed by bazaar gossip, to the effect that the Turkish, not English, post across the desert had just then, February 1908, been robbed. Can Professor Huntington give as good authority for the Palmyra part of his statement that "all modern caravans" go "through Palmyra or Aleppo"?

One reference Professor Huntington has verified, that to the Encyclopedia Britannica, and has then denounced me for the "rash way in which" I have used figures and for my "extreme inaccuracy," an accusation serious enough, if true, to exclude me from the ranks of serious students of history. Yet on the very next page he softens it down to "thus it will be seen that while Professor Olmstead is *technically right* (!), ... his statement is one of those misleading truths which lead to wrong conclusions." Even this does not prepare us to find that his sole objection is that I have followed general usage, both ancient and modern, in applying all the trade data of all Arabia while he would limit "Arabia" for trade purposes to a fragment for which, so far as I know, he has warrant neither in ancient nor in modern writers. Even if he may define "Arabia" as he will, he surely has no right to accuse me of "extreme inaccuracy" when I quote accurately figures dealing with what all writers, ancient and modern, recognize as Arabia. Nevertheless, I am willing to accept his truncated Arabia for comparison if he too will deduct for antiquity the whole trade of the Red Sea and Persian Gulf. When he has done this, where is his authority to prove that his truncated Arabia had in antiquity a trade which could be considered "highly important" in comparison with the "practically nothing" of even $5,000,000?

When Professor Huntington criticises me for being "far from careful in his representations of the views of others," no one would dream that one seventh of my paper by actual count had been devoted to giving "in his own words Professor Huntington's explanations" in the vain hope that this too common accusation might be avoided. Exact quotation of every passage would have made my paper, already too long, impossible of publication, and it is in one of these longer passages that he thinks I have misrepresented him. But he has misunderstood me for I did not believe that any educated man accepted literally all Biblical numbers. His mistake lies in accepting as of *any* value the huge figures so characteristic of documents which the Biblical criticism he decries has proved late and untrustworthy. The very modest numbers found in early sources could never support a theory of a heavy population in early Palestine.

Professor Huntington insists that my "statement that no one" of the Arab oases "can be proved to have been more fertile than at present is absolutely without foundation." I merely meant I knew of no such evidence. He can justify so emphatic a counter statement only by proof from the sources. Why has he not produced it?

Nor did I believe he thought "the desert blossomed as the rose" in antiquity or attempt to prove that the desert, as such, was then a desert. Professor Huntington made certain very definite statements such as "the ancient writers . . . were either fools or knaves" if they said "almost nothing" of the hardships of travel in Sinai and of the impossibility of its supporting multitudes of people,

that there was then "passage of trade and armies across regions *now* desert," that "the crossing of the desert" was "much easier than at present,"-that there were routes then for safe travel while today caravans "do not travel at all for lack of water," that "the desert four and a half millenniums ago" was "peaceful and easily traversed," that "trade of the briskest description" passed over "regions now desert" that "remote parts of Arabia were more accessible than now." To take me to task for proving that Arabia was a desert in antiquity because "no one doubts it for a moment" is evading the fact that every one of my proofs was to directly disprove a definite statement of his.

In my former article, I attempted to confront the reconstructions of Professor Huntington with the facts in a purely impersonal manner. His personal accusations such as "extreme inaccuracy" have introduced of necessity a personal element which I greatly regret. That these accusations are baseless, this note should show. As to his reconstruction of the ancient oriental history, it still remains true that he has not been able to meet one single objection with a proof text from the sources. Until he does so, students of oriental history will not further waste their time in discussing this application of his theory.

A. T. Olmstead,
University of Missouri.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Relations Between the Society and the Association of American Geographers. The Councils of the American Geographical Society and the Association of American Geographers have agreed to cooperate in various ways that will be helpful, it is believed, to their work. The cost of printing the *Annals* of the Association is assumed by the Society. A copy of this annual volume will be mailed by the Society to each of its members and the *Bulletin* will be sent regularly to each member of the Association. All sums received by the Association from the sale of the *Annals* will be paid over to the Society, the fund to be open to receive further contributions, the whole to be devoted to such projects for geographical research or exploration as are approved by a joint Committee of the two organizations. Other phases of cooperation, not yet passed upon, may be considered later.

The Charles P. Daly Medal Presented to A. H. Brooks. At the special inter-monthly meeting of the Society on Tuesday evening, April 8, the Charles P. Daly Medal for Geographical Research was presented to Mr. Alfred Hulse Brooks of the U. S. Geological Survey, Geologist in charge of the Division of Alaskan Mineral Resources since 1903. Councillor Holbrook, chairman of the meeting, in presenting the medal, referred to the many and important contributions which Mr. Brooks and the scientific staff under his direction have made to our knowledge of the geography of Alaska and the distribution of its resources, to the printed results of their work largely contributed by Mr. Brooks and to the map of the Territory prepared under his direction and accepted the world over as the standard map of Alaska.

The medal is thus inscribed: "Awarded to Alfred Hulse Brooks in Recognition of the Excellence and Importance of his Work in the Exploration and Mapping of Alaska."

Upon receiving the medal Mr. Brooks made these remarks:

"The award of the Charles P. Daly Medal, Mr. Chairman, is by far the greatest honor which has come to me. Recalling the achievements of the group of distinguished geographers, from the discoverer of the North Pole to the discoverer of the South Pole, who have received this medal, my own contributions to exploration appear but insignificant. I must therefore regard this award as made not so much for any personal merit, but rather as a recognition of the value of the geographical work of my colleagues and myself in exploring Alaska.

"The exploration of Alaska was begun by the ill-fated Vitus Bering nearly one and three-quarters century ago, but the first real scientific investigation of the territory was inaugurated by Capt. James Cook during his remarkable voyage made thirty years later. Inspired by Cook, the navigators of several nationalities extended the knowledge of the shore line, but for nearly a century after Bering's death knowledge of the interior was limited to the random notes of the fur trader.

"Credit for the first scientific exploration of the vast inland region belongs to Dr. William H. Dall, Robert Kennicott, and their colleagues of the Western Union Telegraph Survey. After our acquisition of Alaska the charting and investigation of its shore line was prosecuted with vigor—a field of scientific inquiry in which Prof. George Davidson was especially conspicuous. Meanwhile, exploration of the interior lagged, though a number of journeys along the larger waterways were made which added much to geographical knowledge. Among these the exploration of Major Henry T. Allen was the most remarkable.

"This brief review brings us down to the modern epoch of exploration, begun under federal auspices some sixteen years ago and inspired largely by the popular interest excited through the discovery of the Klondike gold. In this epoch of exploration the geologists and engineers of the federal Geological Survey have played a conspicuous part. Perhaps the most notable result of these investigations is the fact that the pioneers of this northland have come to look to the scientist for guidance in their efforts to open up an empire.

"While much has been accomplished in the exploration of Alaska, much remains to be done. Over one-quarter of this, our largest and most valuable outlying possession, still remains an almost unknown land, while over two-thirds is almost unsurveyed. There is, therefore, in this northern land a field of geographical research for the generation to come. I earnestly hope and believe, Mr. Chairman, that your Society will in the future, as it has in the past, take a part in this work.

"In receiving this medal, Mr. Chairman, I again thank you most earnestly, not only for myself but also in behalf of my colleagues who must share with me the honor as they have the arduous work which has led to this award. I am sure that this recognition will inspire us to continue our efforts to increase the geographical knowledge of Alaska."

Additions to Our Map Collection. A number of important additions to the Society's map collection have recently been made in the way of complete sets of large-scale topographic maps issued by foreign governments. Most of these sets have been presented by home and colonial topographic bureaus. The following are some of the most noteworthy of these acquisitions:

The colored edition of the one inch to a mile British Ordnance Maps; the 1:100,000 topographic map of Germany published by the Kgl. Preuss. Landesaufnahme; the 1:100,000 map of Belgium in 26 sheets published by the Institut Cartographique Militaire at La Cambre; the 1:100,000 map of Portugal published by the Direcção dos Trabalhos Geodesicos y Topographicos in Lisbon; the 1:100,000 map of Norway published by the Norges Geografiske Opmaaling; the topographic map of Iceland published on a scale of 1:50,000 by the Danish General Staff; the topographic sheets issued on a scale of 1:50,000 by the Bulgarian War Department and the 1:100,000 map of Rumania prepared by the Rumanian Staff.

Sets of the published sheets of the inch to a mile topographic map of Canada, the inch to three miles sectional map of Canada and the 1:100,000 map of Mexico published by the Comisión Geográfico-Exploradora have likewise been received from the issuing bureaus. The 151-sheet map of Asia published by the Japanese Government and the topographic and geological maps of the Imperial Geological Survey of Japan have also been acquired as well as various sets published by French and British colonial surveys such as the Section Cartographique du Gouvernement Général de l'Algérie and the Anglo-Egyptian Sudan.

The 1:50,000 sheets of the Atlas Topographique de la Suisse have also been added to the Society's collections. The 1:1,000,000 maps of Asia issued by the Service Géographique de l'Armée and the Kgl. Preuss. Landesaufnahme have been completed by the acquisition of the missing sheets. The Indian Survey kindly forwarded the lacking sheets of the 1:1,000,000 map of India and adjacent countries and the Geographical Section of the British General Staff contributed its excellent series of 1:1,000,000 maps of Africa.

A photographic reproduction of Cabot's large world map of 1544 has been added to the Society's collections of reproductions of ancient maps. Only one copy of the original is known. It is in the Bibliothèque Nationale in Paris where it has been part of a collection in the Cabinet Géographique since 1844, in which year it was purchased for 4,000 francs by the French Government after having been accidentally discovered in the house of a Bavarian priest. The map is the only one that may be ascribed to Cabot although a number of separate references to the explorer's lost maps can be found in various historical documents.

The map is made up of four separately printed sections pasted together on pasteboard. It bears no name, title or date. The legend which is pasted on both sides, however, says that it was compiled by Cabot in 1544. The inscriptions it contains and the long notes on either side of the planisphere contain information on the various countries of the world. The natural resources and exports to Europe from each are enumerated. Sailing directions and data on the discovery of many coasts and islands are also included. The western coast of North America above the peninsula of Lower California is not delineated. The map is ornamented in the usual fashion of the day with large heads of Aeolus in each corner, legends and cosmographical tables.

Meetings of the Society. A special inter-monthly meeting of the Society was held at the Engine ring Societies Building, No. 29 West 39th Street, on

Tuesday, April 8, at 8.30 P. M. The Chair was occupied by Councillor Levi Holbrook, who introduced Mr. Vahan Cardashian, Counsel to the Ottoman Consulate-General. Mr. Cardashian addressed the Society on "The Ottoman Empire." Many lantern views were shown.

The last meeting of the Society before the summer recess was held at the Engineering Societies Building on the evening of April 22. The Chair was occupied by Recording Secretary Hamilton Fish Kean. The following persons recommended by the Council were elected to Fellowship:

Arthur John Farmer
Rudyard Kipling
Donald B. MacMillan
Alvan Markle
George Grant Mason
J. Victor Onativia, Jr.
William M. Polk
Chester A. Reeds
Emile Rey
Theodore Roosevelt, Jr.
Charles F. Shaw
Edwin R. A. Seligman
George O. Simmons
J. Noah H. Slee
D. B. Steinman
Charles P. Steinmetz
Carl Stoeckel
James Streat
Stephen Dows Thaw
Burton Merrill Varney
Mrs. Anna M. von Zedlitz
Elmore A. Willets
Frederick N. Willson
J. Howard Wilson
Will McClain Winton
Richard P. Worrall
Charles H. Young

The Chairman then introduced Mr. Arthur Stanley Riggs, who addressed the Society on "The Philippines and the Filipinos," illustrating his interesting discourse with many lantern views.

NORTH AMERICA

Abstract of the Thirteenth Census. The Bureau of the Census has just issued a report in condensed form of the Thirteenth Census, 1910. It covers the four principal branches with which the census dealt—population, agriculture, manufactures, and mines and quarries. It is complete as to all subjects comprised under these four branches excepting those dealing with occupations and one or two minor inquiries relating to the population schedule. The exhaustive reports in the bulky volumes of the census are invaluable for minute reference but inconvenient for general use because the main results must be picked out from a mass of detail, and often the consultant is compelled to search through the several volumes for complete statistics. The abstract assembles in one place all the general results of the census. This small quarto volume of 569 pp. will be very convenient and useful for all ordinary purposes of consultation.

Water Power on the Middle Mississippi. The great dam across the Mississippi River at Keokuk, Ia., is now practically completed. The dam was built at this point because the Des Moines Rapids offer there exceptional facilities for the utilization of water power. In 1905, Congress authorized the Mississippi Power Co. to carry out the work. Many difficulties were encountered, but the Chief Engineer, Mr. Hugh L. Cooper, has been able to provide practical solutions for all problems. The dam is nine-tenths of a mile long and has much the appearance of a bridge, its 119 arched spans each being in fact a spillway, permitting the passage of water through the upper part of the spans which are fitted with sliding steel gates regulating the flow. The dam is built of solid concrete and its foundations are sunk five feet in the solid rock of the river bottom. The power house, nearly a third of a mile long, on the Iowa side of the river, contains turbine water wheels which are supplied with water through thirty arched portals. Each turbine has a normal water head of thirty-two feet and develops 10,000 horse power of electricity. An enormous lock, with greater lift than any at Panama, will permit the much more rapid passage of vessels than the three small locks that have hitherto been used. The dam will hold back the water for about sixty-five miles above its site, and through the slack water thus formed a navigable channel of not less than eight feet will be maintained at all times. It is believed that this great enterprise will bring about a large development of manufacturing in this part of the Mississippi Valley which, with river navigation to the Gulf of

Mexico, and the Panama Canal, will offer unsurpassed opportunities for world-wide commerce.

Local Climates in Utah. The larger characteristics of climate must be similar over areas which are subjected to the same general controls. Therefore it is true that few places really have their own individual climates in any distinctive sense. Local controls, however, do affect local climates in many smaller ways. Among these controls topography is naturally an important one.

Mr. J. C. Alter, of the United States Weather Bureau at Salt Lake City, has investigated "Some Effects of Surface Slope on Climate" in the Salt Lake Valley, south of Salt Lake City (*Monthly Weather Rev.*, Vol. 40, 1912, No. 6, p. 929), particularly at Wandamere, a suburb of Salt Lake City about five miles south and one mile east of the center of the city, and at East Mill Creek, near the Wasatch foothills, two miles east of Wandamere. At Wandamere there is opportunity for nocturnal drainage of cool air into the bottoms, while at East Mill Creek the orchards lie well above the level to which the cold imported air rises. Therefore the orchards at the latter place get an average of two weeks start over those at the former. There is a difference of 200 feet of elevation and of 14 days in the season. Therefore fruit ripens (roughly) one day earlier for each 14 feet of rise in elevation. Taking into consideration the daily march of temperatures in spring at Salt Lake City (1° rise in about 3 days), the author concludes that the 14 foot rise in elevation, equaling one day's advance in fruit, is equivalent to 0. 3° F. increase in the daily mean temperature. Temperature records are not yet available for these two stations. This is, therefore, an interesting example of the use of phenological observations to help out meteorological records. R. DEC. WARD.

Fighting Frost. Dr. P. J. O'Gara, Special Meteorological Observer at Medford, Ore., is doing effective work in the local study of frost prevention and prediction. In *Bulletin No. 5*, issued from his office, entitled "The Prevention of Frost Injury in the Orchards of the Rogue River Valley, Oregon," is an excellent study of methods of frost fighting, a discussion of the weather conditions which accompany frost, and an account of the whole frost campaign. Among the illustrations, he shows the oil pots burning at night during the danger period. The best fuels for use in frost fighting are considered in *Bulletin No. 6*, "A Comparative Test of Fuel Oils and Appliances used in Orchard Heating to Prevent Frost Injury" (1912).

Prof. Henry J. Cox, of the U. S. Weather Bureau, has been making a field study of frost conditions in the cranberry marshes of Wisconsin, New Jersey and Massachusetts ("The Weather Bureau and the Cranberry Industry," *U. S. Dept. of Agric. Year Book for 1911*, pp. 211–222). As these three States produce an average of 75,000, 150,000 and 300,000 barrels of cranberries respectively a year, it is easy to see how important the question of frost protection becomes. Professor Cox's studies in Wisconsin have proved of great advantage to the growers there. R. DEC. WARD.

Neurasthenia and Climate in the United States. Dr. J. Madison Taylor, in a recent paper on "Neurasthenia in the United States" (*N. Y. Med. Journ.*, 1912), holds that "the fundamental agency in the production of nervous irritability, or subversion of vital energies, is to be found in peculiarities of climate not adequately reckoned with, and their corollary, careless omissions to observe economic modes of life, whereby the hurtfulness of local climatic conditions can be escaped." This statement the author believes to be true for blonds, in particular, and in this view he is in accord with the opinion which has been so strongly advocated by Col. Charles E. Woodruff, U. S. A., during the past few years. In the hot summers of the United States, the glare of the sunshine, and the rapid temperature and humidity changes, Dr. Taylor sees good reason for a greater prevalence of neurasthenia than in most of the European countries from which our people have come. He believes that we should adapt ourselves to our summer conditions by changing our working hours, beginning earlier and allowing time for a siesta; children should be kept under shade during the noon hours and encouraged to sleep; playgrounds ought to be covered and cool baths provided; our clothing should be adapted to our tropical summer climate; houses should be kept cool by fans, awnings, etc. "By such means as these," Dr. Taylor believes, "may we confidently expect large economies in health and invigoration." R. DEC. WARD.

Colima in Eruption. The Volcano of Colima in the State of Jalisco, Mexico, is reported to have been in violent eruption on Jan. 20. From all accounts the eruption was chiefly in the form of gases and volcanic ashes, which fell over a wide area and, in places near the volcano, to a depth of several feet. Ashes fell as far north as Guadalajara, a distance of 100 miles.

SOUTH AMERICA

German Steamers on South American Rivers. A German company has been formed to run a service of cargo boats on the rivers La Plata, Paraná and Paraguay. The first boat, 800 tons, has arrived at Montevideo. It has a speed of nine knots an hour. The fleet will consist of four river steamers, four lighters of 500 tons each and an ocean going tug. All will sail under the Uruguayan flag.

Earthquakes in South America. A violent earthquake occurred at Guayaquil, Ecuador, at 9.40 P. M. on Feb. 22. The panic-stricken people rushed into the streets. The first shock lasted more than a minute and was followed by lighter after-shocks during the night of Feb. 22 and on the 23d. The city of Guayaquil is built upon low flat ground on the west bank of Rio Guayas, near and lapping up against the base of the Cerro de Santa Ana, a low Cretaceous hill. This earthquake was felt generally throughout Ecuador. It was most severe in the provinces of Loja, Azuay and Canar, where houses were overthrown. It was also felt in the northern part of Peru. Further shocks occurred in Ecuador and, on the night of Feb. 26, they were especially severe at Cuenca and in the neighborhood of Chimborazo at Ambato and Riobamba, all of them in the Andes.

AFRICA

The French Transafrican Railroad. French colonial activity has recently been manifest in studies for a railroad line to connect the French colonies of northern Africa with the French Sudan and French Equatorial Africa. A preliminary account written by Captain Niéger for *La Géographie* (Feb. 15, 1913, pp. 109–115) contains the results obtained during an expedition headed by this officer in 1912. The object was to reconnoiter the region between Insalah and Lake Chad which would be most suitable for the building of a railroad line; also to determine the route for a branch to start from the southwest corner of the Ahaggar mountains and reach the Niger between Gao-Gao and the Tilemsi River.

The region examined lies between the Greenwich meridian and 10° 30′ E. It is bounded by parallels 21° and 12° N. The route followed started from Aulef, the ascent toward the Ahaggar uplift being made through the line of depression between the Muydir and Ahenet mountains. The line was then to extend toward Selet in a westerly direction. From this last point a number of routes determined by the break between the Adrar and Air mountains were surveyed. All these led to Agades, beyond which a relatively easy route to the shores of Lake Chad could be determined.

The varied activities of the members of the several parties into which the mission was divided bore results in the collection of valuable scientific and economic data. Altogether about 9,000 miles of new itineraries were surveyed. The geographical coordinates of 150 points were determined by astronomic or geodetic methods. Careful aneroid readings furnished data which sufficed for the construction of profiles and sections.

ASIA

Captain Leachman's Journey Across Arabia.* In November last the Council of the Royal Geographical Society made a grant to Captain Leachman toward the expenses of his proposed journey across Arabia. His object was to go right across the center of the country. He started on Nov. 3 and, writing

* The transliteration of place names, as given here, differs much from that on the Stieler map, the leading atlas map of Arabia, but it is not difficult to follow on that map the route of Leachman, who advanced from Bir Mélosa in about 33° 20′ N., 40° 10′ E., in a generally southeasterly direction to Riadh in about 24° 40′ N., 46° 45′ E., then probably farther south and finally northeast to the Persian Gulf at Bahrein. It was evidently a notable journey, and further particulars will be received with interest.

from the Persian Gulf on Jan. 1, 1913, he gives a summary of his journey which appears in the *Geogr. Journ.* (Vol. 41, 1913, No. 2, pp. 147–148).

Leaving Damascus he traveled by the Baghdad Desert route to Bir Mélosa or Gahra, about half way to Baghdad. From there he struck southeast with four men, marched to Arar, then across the wells of Hazil to Leinah and south to Qusaibah, the first village in Quasin. From Aiyun he journeyed leisurely to Boreidah and thence to Shajra in Woshem and by Doreiye to Riadh. He spent a week in Riadh and saw much of this not very large town. From there he went down to El Hasa by a route to the south of Abu Jifan and thence to Ojeir and the Island of Bahrein, which he reached on Dec. 27. He then went north to Bushire. He learned much about the south country. The great Wadi of Riadh, Hanifa, undoubtedly reaches the sea south of Qatar. Wadi Duwasir and Wadi Nejran, called in its lower course Wadi Aftanah, both disappear in Robu el Khali, and Jebel Tuwariq runs all the way to Bisha and the bend of Wadi Duwasir.

King George V. Group in the Himalaya. The *London Times*, Weekly Edition (March 28, 1913), says that the King has acceded to the request of Mrs. Fanny Bullock-Workman for his consent to the naming of the new group of peaks at the head of Rose Glacier among the Karakoram Mountains of the Himalaya, the King George V Group. This cluster of high peaks, twelve miles long, was first seen and identified as such by Mrs. Bullock-Workman's 1912 expedition, the main results of which were described by the explorer in the *Bulletin* (Vol. 44, 1912, pp. 897–903). Three of these peaks were triangulated by her surveyor; and with the consent of the Viceroy of India Mrs. Workman proposes giving the name of Mount Hardinge to one of the highest of these mountains. This nomenclature in no way clashes with that established by the Indian Survey and is to be used on Mrs. Bullock-Workman's map, which, when published, will be the first detailed map of the Siachen or Rose Glacier, forty-seven miles long.

Results of the Abor Expedition. A paper by Mr. A. Bentinck on the geographical results of the Abor Expedition is printed in the *Geogr. Journ.* (Vol. 41, 1913, No. 2, pp. 97–114). The trip was not so successful geographically as it was expected to be, because the party, though repeatedly reaching excellent points for survey work, were prevented from seeing much by the haze that overspread everything. The Dihong River was ascended to a little north of 29° 45′ N., but no very definite idea could be formed of the course of the river beyond that point. The identity of the Dihong with the Sangpo of Tibet was therefore not demonstrated. Mr. Bentinck himself entertains grave doubts as to the reliability of Kinthup, whose work has long been relied upon as practically proving that the Sangpo and the Brahmaputra are the same river. On the other hand Sir Thomas Holdich, discussing Mr. Bentinck's paper, expressed the opinion that Kinthup did prove that these rivers are really one and the same stream. He said that if Kinthup was wrong we must get rid of this difficulty: "Certain marked logs were put into the Sangpo by him which were to float down to the Brahmaputra. I have always understood that they *did* reach the Brahmaputra and were identified. If so it is a little difficult to see how they failed to follow a continuous stream. I think we must say that we have known now for the last 75 years that the Sangpo and the Brahmaputra are one and the same river and the credit of that discovery belongs to Kinthup."

Mr. Bentinck said that the term Abor is a name of which the Abors themselves are ignorant. It covers a number of tribes which do not recognize any close community of interests or policy. Contrary to earlier reports, he testifies that the Abors are generally peaceable and orderly.

AUSTRALASIA AND OCEANIA

The Northern Territory of Australia. The expedition consisting of Professors Baldwin Spencer and Gilruth, Dr. Wollnough and Dr. Breindl, sent out in 1911 to study the resources and general conditions of the Northern Territory, have thus far issued three bulletins. This region has hitherto not been systematically studied. Dr. Spencer studied especially the ethnography, Dr. Wollnough the geology, while Professor Gilruth investigated the possibilities of stock-raising, etc., and Dr. Breindl the health conditions of whites and natives. After preliminary work in and around Port Darwin the party went south to the rail-

road terminus at Pine Creek and thence to the Gulf of Carpenteria. In the settlements there the general health of the whites was remarkably good. No signs of physical deterioration were visible even in those who had spent several decades in the Territory. Life in the back country, with proper precautions, is healthy, the cool winter months affording recuperation from the effects of the damp heat of summer. In the mining townships, malaria and dysentery occur but are due to remediable conditions. Although within the tropics, this part of Australia is not really tropical and the usual tropical jungle is almost absent. Live stock were in excellent condition, and there is opportunity for large extension of this industry. The country seems unsuitable for sheep, but goats are valuable and supply both milk and meat. The so-called civilized native in the settlements is generally a useless loafer, while the native in the back-blocks, under the charge of a humane man, is a cheerful worker, invaluable to travelers and of the greatest service on cattle stations. The northern mining area has important potentialities, but further examination and more scientific methods of working are needed. Between Darwin and the Egypt River the soils except on the larger streams are mostly of poor quality but from the Egypt to McMinn's Bar on the Roper River the limestone and volcanic rocks afford rich soils. Lower down the Roper there are rich alluvial plains though the sandstone of higher lands yields a poor soil. The Edith, Katharine and Roper Rivers are perennial, and the plentiful rainfall of the wet season fills all the rivers and creeks. Irrigation on a large scale should be feasible. The prospecting expedition under Mr. W. J. McCaw to Caledon Bay on the north-east coast (Arnheim Land) did not find much encouragement as to mineral wealth, but much of the country was thought suitable for cultivation and an area along the Wilton River seemed suited for stock-raising. (*Geogr. Journ.*, Feb. 1913.)

Rubber Culture in Hawaii. Mr. Harrington, the Acting British Consul at Honolulu, reporting on the trade of Hawaii for the year ending June 30, 1912, says that rubber is steadily becoming more important among Hawaii's products. Many trees have been planted on the island of Maui, and 35,000 trees were tapped in 1912, yielding about 8,000 pounds of rubber. An output of 20,000 pounds is anticipated for 1913. Attention has been directed to an indigenous rubber tree (*Euphorbia lorifolia*) which grows in several localities, especially in the island of Hawaii, where one district has 6,000 acres averaging 75 trees to the acre whose product is 14 to 17 per cent. rubber and 60 per cent. resin (chicle). The latex is said to contain 42 per cent. of solid material, and one man can collect 16 to 30 pounds of crude product a day. (*Board of Trade Journ.*, Vol. 80, 1913, No. 852, p. 737.)

POLAR

Antarctic

The Australian Antarctic Expedition.† Dr. Mawson's ship, the *Aurora*, reached Hobart on March 14. The further details given by those on board, together with one or two messages received by wireless from Dr. Mawson himself, make it now possible to gain a clearer knowledge of the circumstances which led to the loss of Lieut. Ninnis and Dr. Merz, and to the enforced detention of the leader in the inhospitable region of Adélie Land. On the arrival of the ship at the main base, Dr. Mawson had not returned from his expedition into the interior* and as it was necessary for the *Aurora* to proceed without delay to the second base for the purpose of bringing away Mr. Wild's party, it became evident that the leader might have to submit to a forced detention for a second winter. The whole party were ready to stay and search for their leader during the ship's absence, but in the end it was decided that six only should remain.

The *Aurora* left on Feb. 8, and only eight hours later received a wireless message saying that Dr. Mawson was safe, and instructing her to return to Commonwealth Bay, which she did. But a hurricane prevented all communication with the land, and the captain therefore decided to start again for Mr. Wild's base, as delay might prove disastrous to his party. Making all speed by the use of both steam and sails, and keeping on even at night, the *Aurora* threaded her way by narrow leads amid vast fields of pack-ice, and succeeded in carrying out her task.

* According to one account, Dr. Mawson had pushed inland almost to the position of the South Magnetic Pole; but whether on this or on a previous trip is not quite clear. †See map, p. 424.

She reached the second base on Feb. 23, and took off Mr. Wild's party, eight in number, who were all well. Mr. Wild reports the formal taking possession for Great Britain of the land between Kaiser Wilhelm Land and 101° 31′ E., under the name of King George V Land.* The coast-line trended almost due east and west, and was almost on the Antarctic circle.

From Dr. Mawson's messages it appears that he was accompanied on his last sledge expedition by Lieut. Ninnis and Dr. Merz, and that on Dec. 4, 1912, while exploring a new coast-line 300 miles south-east from the winter quarters, the young officer disappeared in an unfathomable crevasse, with a dog-team and almost all the food. The other two were left with scanty supplies and six starving dogs, on whom they chiefly subsisted while endeavoring to make their way back across the plateau. Bad weather impeded their progress, and on Jan. 17, Dr. Merz died from the results of insufficient nutrition. Dr. Mawson made his way alone to the hut, through snow and fogs, over heavily-crevassed ice, miraculously guided, as he says, by Providence. He arrived only a few hours after the departure of the *Aurora*, which does not seem to have been able to return after rescuing Mr. Wild.

Various accounts describe the weather conditions in Adélie Land as the worst experienced in any part of the Antarctic, and it is to be feared that Dr. Mawson and his six comrades may have a trying time during their enforced detention (*Geogr. Journ.*, Vol. 41, 1913, No. 4, pp. 355–356).

Arctic

The Crocker Land Expedition. Some facts relating to the personnel of the reorganized Crocker Land Expedition are here added to the information recently published in the *Bulletin* (Vol. 45, 1913, pp. 137 and 371). Donald B. MacMillan, the leader, won his spurs in Arctic work as one of Commander Peary's lieutenants during the successful quest of the North Pole in 1908–1909. He traveled over 2,000 miles with dog-team along the northern shores of Grant Land and the archipelago north of Greenland. It was from Cape Morris Jesup that MacMillan and Borup made their record march covering 336 miles in eight days. MacMillan is a graduate, and Honorary A. M., of Bowdoin College. He has spent the three and a half years since his return from the Arctic, studying, lecturing and traveling. The summers of 1910 and 1912 were given to exploratory, ornithological and archæological work in and along the coast of Labrador. The year 1910–1911 and the past autumn and winter have been spent at Harvard University working in anthropology and practical astronomy. Mr. MacMillan is of Scotch ancestry and was born in Massachusetts 37 years ago.

W. Elmer Ekblaw is a native of Illinois, thirty years old and of Scandinavian ancestry. He took his degrees A. B. and A. M. at the University of Illinois, specializing in geology, botany and ornithology. He has been an instructor in geology in that institution; has done much field work and will have charge of the geological and botanical work of the expedition.

Ensign Fitzhugh Green, U. S. N., graduated at the Naval Academy, Annapolis, four years ago, at the age of twenty years. He was born in Missouri. His experience has been largely at sea. He was in command of a turret on the U. S. S. *Michigan* and has likewise done mapping of coast lines. He has taken special studies during the past year in cartography, meteorology, seismology, terrestrial magnetism and wireless telegraphy, and will have charge of these branches of the work.

Maurice C. Tanquary is a native of Wisconsin, was graduated from the University of Illinois in the class with Ekblaw and continued his university work till he received the degree of Doctor of Philosophy. He specialized in zoölogy, more particularly entomology, and will have charge of the zoölogical work of the party including fishes and mammals. He is 31 years old.

In addition to the strictly scientific staff, a surgeon will be selected. The party also includes an expert electrician who will have charge of the wireless and other electrical outfit at headquarters; he will also make meteorological and seismological observations during the absence of Mr. Green. A good mechanic, boat-builder and cook has also been engaged. The expedition will start north in

* That is, to the eastern extremity of Knox Island as it appeared on Wilkes's chart.—Editor *Bulletin*.

July under the auspices of the American Museum of Natural History and the American Geographical Society with the co-operation of the University of Illinois and the assistance of the United States Navy Department, the United States Department of Agriculture (through the Weather Bureau), the United States Coast and Geodetic Survey, the United States Geological Survey, the United States Bureau of Mines, the Carnegie Institution of Washington (through its Bureau of Terrestrial Magnetism), Yale University, Colgate University, Bowdoin College and Worcester Academy. About 130 subscribers have helped to finance the expedition. Publishing houses and other firms, by direct donations or concessions in prices, have aided substantially to complete the equipment.

Wireless telegraphy is to be utilized for the second time at the land headquarters of a polar expedition. This will be used in connection with the fully equipped weather bureau station that will be established at the home base of the party on Flagler Bay (Kane Basin.) It is hoped in this way to keep the land base in daily communication with the expedition. Wireless has been an effective part of the outfit of the Mawson Antarctic party.

General Result of the Norwegian 1911-1912 Arctic Expedition. Messrs. Arve Staxrud and Adolf Hoel, who led the 1912 parties, published a summary of their work in *La Géographie* (February 15, 1913, pp. 99–108). The expedition left Tromsö on June 25 and reached Green Harbor, Spitzbergen, on July 3. The first stop was made here until July 16. The west coast between South Cape and Bell Sound was found to be lined by floe ice some 40 miles wide. Wood Bay was attained on August 1. During this last part of the trip the explorers examined King Bay where the nunataks of the inferior section of the large glacier were visited in order to determine the boundary between the granitic zone of northwestern Spitzbergen and the Devonian and Carboniferous regions of the south and east. The coast becoming icebound toward the end of the month the return to Green Harbor was made on August 27, Tromsö being attained on September 6.

A part of the results of the geodetic and topographic work was summarized on a map on a scale of 1:50,000 with contour curves, interval 50 meters. About 1,000 square miles of area were covered in this manner. This region lies between the west coast and a line joining Coles Bay to Axel Island on the east.

The original program consisted in the preparation of a 1:50,000 map which would include the region bounded on the north by Ice Fiord and by Bell Sound and Van Nijen Bay on the south. For this purpose a triangulation network was determined. Advantage was taken of the rapid methods of surveying obtainable by the use of light instruments provided with easily legible graduation scales and by the use of photography for detail work. The scale of 1:50,000 was suggested by the fact that the map is not only destined to form the basis of a scientific survey of the country but also to provide a hydrographic document of practical utility for the use of navigators. It is furthermore intended to serve in prospecting and in the delimitation of mining areas. This last need was foreseen in view of the discovery of coal deposits in the region.

Important geological reconnaissance was undertaken by the geologists of the expedition. The Carboniferous of the peninsula between Green Harbor and the coast was explored. Stratigraphic and tectonic investigations were carried on in the Bragger Peninsula. The general features of the uplifted region lying between King Bay and Wood and Ekman Bays were determined. The southerly extension of the Back Bay fault line was followed and a study made of the shores of St. John Bay.

In addition, a detailed plan of the region characterized by thermal springs near Back Bay was compiled. As many as ten volcanic necks between Wood and Rock Bays were noted. All this information will ultimately be represented on a geological map, the only compiled portion of which consists of the peninsula between Ice Fiord and Bell Sound, this section having been drafted by the members of the expedition on a scale of 1:50,000.

EDUCATIONAL GEOGRAPHY

Geography at Columbia's Summer Session. During the summer session of Columbia University, the following courses in geography will be given by Pro-

fessor D. W. Johnson: "Physical Geography and its Economic Aspects," an elementary course involving laboratory and field work; and "Physiography of the Western United States," a course designed for those who desire more advanced training in the principles of physiography as well as an acquaintance with the surface features of the western part of our country.

Courses dealing more directly with the methods of teaching geography in elementary schools will be given by Dr. C. T. McFarlane and Miss C. B. Kirchwey (by the latter: "General Geography" and "Continental Geography for Schools").

The geographical equipment at Columbia University has been largely increased during the past year. Over fifty wall maps have been prepared by mounting together grouped sheets of the topographic surveys of different nations. The cartographic collections have been further increased by an extensive series of German maps, valued at $1,000, purchased by the Germanistic Society of America under the direction of Professor Penck, and now deposited permanently with the Department. Seven large map cases, similar to those made for the American Geographical Society, are in process of construction, and a special map room will be provided as soon as the cases are ready for use.

Through gift and purchase the Department has secured more than 500 excellent photographs of American and European land forms, which will be mounted for class use with maps and explanatory descriptions. Among the large framed views recently secured are several which were on exhibition in the lecture hall of the American Geographical Society last fall, and two large oil paintings of scenery in the Glacier National Park. The Department has just learned informally of a gift of $1,800 intended for the development of its lantern slide collection; and the Departmental library has benefited by a gift from the Germanistic Society for the purchase of books on German "Länderkunde." One of the lecture rooms in Schermerhorn Hall will be equipped as a geographical laboratory during the summer.

International Exhibition of Wall Maps. An international exhibition, educational diagrams, etc., for use in schools was held at Rome in May under the auspices of the "Associazone per la Cultura Artistica Nazionale." The purpose was to give publishers of all nations an opportunity to exhibit their products in that city. Similar exhibitions have from time to time been held in other countries. Most notable among them were the exhibitions of the Royal Geographical Society in London and of the Brooklyn Institute of Arts and Sciences, in Brooklyn, New York, Boston and other cities.

A Course in Topographic Mapping. Mr. A. M. Walker, Topographic Engineer of the U. S. Geological Survey, spent the time from March 14 to April 5 in giving a course in topographic mapping to advanced students in the Department of Geology of Northwestern University.

ECONOMIC AND COMMERCIAL GEOGRAPHY

A Coal Atlas of the World. An atlas containing about 70 colored maps, 14x20 in. in size, will accompany the 1200 pp. monograph on the coal resources of the world which is being published by the Executive Committee of the XIIth International Congress of Geology under the editorship of Messrs. William McInnes and D. B. Dowling. The atlas sheets will show the distribution of coal in the different countries, the extent and depth of each basin being indicated whenever possible. The geology will be illustrated by colors in many cases, and several sections will be reproduced. The following partial list of the atlas maps will give an idea of the wide scope of the compilation: Austria will be represented by 8 geologically colored maps of Austrian coal fields; France by 27 geologically colored maps and sections; Great Britain by a map showing coal areas in red; the United States by a map on which the distribution of the different classes of coal will be shown; China, Manchuria and Korea, each by two maps showing distribution of coal fields; Turkey, India, the Dutch East Indies, New South Wales and Western Australia each by a map of the location of coal fields; Sweden, Rumania, Servia, South Africa, Japan, and Queensland each by a colored map conveying similar information; Canada will be represented, in addition to a general map showing the distribution of coal areas, by a number of regional maps

among which those of the Maritime Provinces, Saskatchewan, Alberta and British Columbia as well as the more detailed Crowsnest, Blackmore and Cape Breton sheets will be noteworthy. In addition a number of maps illustrating the reports from Germany, Russia and the Central and South American countries will be included. Some 120 maps will furthermore be scattered throughout the text of these reports, so that the whole work will contain about 200 maps.

From the standpoint of economic geography the monograph will be as valuable to geographers as it will be indispensable to the technical world. While over two years have been spent in its preparation, the several reports taken together will give the world results acquired in a far longer period devoted to the investigation of the coal resources and reserves of the globe. In some cases, actual field work had to be undertaken to elucidate some knotty point that affected the thoroughness of the report. Even the Arctic and Antarctic regions are discussed in the light of our present knowledge. Except in the case of iron, the investigation of which was conducted under similar auspices three years ago, no other mineral will have been so thoroughly examined with regard to its usefulness to mankind. LEON DOMINIAN.

Further Change in the Transatlantic Route. As a result of the meeting held at Brussels in March all the North Atlantic passenger lines represented in the conference agreed to a change of route from April 15, the anniversary of the sinking of the *Titanic*. The new summer route, which went into effect on Jan. 15 last, meant that both eastward and westward steamers would cross the meridian of 47° W., one degree further south than a year ago. The present change means that the liners will go even further south. In past years the routes which went into effect on Jan. 15 were followed as a rule until August, when more northerly courses were brought into force. A system has also been arranged for modifying the routes further in case of abnormal ice conditions.

This season the U. S. Revenue cutters *Seneca* and *Miami* have established a patrol to keep in touch with the ice fields and icebergs drifting down to the neighborhood of the Grand Bank of Newfoundland and to determine their southerly, easterly and westerly limits, sending wireless messages particularly of ice in the neighborhood of the transatlantic lanes. (*London Times*, Weekly Edition, April 11, 1913.)

OCEANOGRAPHY

Ocean Temperatures Along the West Coast of North America. Dr. George F. McEwen, Physicist of the Marine Biological Station at San Diego, has recently published a valuable article explaining the cause of the cold water belt lying along the Pacific Coast.*

There is a popular notion that a "warm Japan stream" washes the coast of California—a notion that persists despite the fact that sea-faring men and students of oceanography have long known that for hundreds of miles along the California coast the temperature of the sea water is really colder than that of the mid-Pacific. On modern maps this body of cold water slowly moving southwest is called the California Current instead of the Japan Stream, for the latter becomes indistinct and is lost as a definite stream in the vicinity of the Aleutian Islands. This cold water along the California shore not only lowers the temperature of the westerly summer winds and thus saves the coast from the oppressive heat of the eastern summers, but also is undoubtedly a large factor in causing the fog which frequently hangs along the shore to the perplexity of coast trade steamers.

Dr. McEwen's scholarly paper, based on a new theory of oceanic circulation developed by Ekman of Christiania (1905–6), may be summarized very briefly as follows:

Numerous observations, over a long period, have fully established the fact of abnormally cold water along the west coast of North America. Various theories have been advanced to explain the source of this unusually low temperature, the most diverse of which theories are enumerated here. Dall (1882) attributed the low temperatures to the cooling of the Japan Stream in its long and slow passage through the North Pacific. Richter (1887) attributes the cold water to a Polar current which crowds the Japan Stream off shore. According to Bishop (1904)

**Internationale Revue der gesamten Hydrobiologie und Hydrographie*, Band V, Heft. 2 and 3, 1912, pp. 243–285.

its source is to be found in the water cooled by contact with the front of the great continental glacier of the Antarctic regions—this cold water, he supposes, creeps northward along the bed of the Pacific Ocean to be finally thrown by the rotation of the earth against the coast of North America. Holway (1905) called attention to the fact that the surface water to the northward of Cape Mendocino is warmer instead of colder as assumed by Dall and Richter—and thus shuts out the existence of surface currents from the north. He attributes the low temperatures to the upwelling of cold water from the ocean depths. That the vicinity of Cape Mendocino has the coldest water along the coast he says is due to the influence of a submarine valley which heads near Cape Mendocino. Dr. McEwen bases his discussion on recent work of Ekman, who, using the theory previously advanced that constant winds will establish an ocean current, adds to previous calculations a consideration of the deflection due to the earth's rotation and shows that the wind-driven current will be deflected off shore, which deflection will force an upwelling of cold bottom water along the shore.

The extremely interesting and convincing point in Dr. McEwen's article is found in his mathematical calculation of the temperatures that ought to exist at San Diego, Pt. Conception, San Francisco and Cape Mendocino, because of the upwelling that theoretically should be produced according to the wind velocities of the U. S. Pilot Chart records.

Dr. McEwen's mathematically calculated temperatures based on Ekman's theories closely agree with the actually recorded temperatures at each of the four stations mentioned. These temperatures, it must be remembered, are decidedly abnormal, and, considering the complexity of the problem, this close agreement of observation and theory is strong evidence for the correctness of the new explanation advanced. Dr. McEwen is extremely modest as well as scientifically careful in concluding "that from the results already obtained it would be profitable to carry on a more detailed and quantitative investigation following the lines suggested in the present paper."

As one of the previous writers on the subject the present reviewer of Dr. McEwen's paper feels the question has been advanced by him from the stage of theorizing about qualitatively known conditions to the plane of accurate quantitative measurement of facts and of mathematical demonstration. It is a matter of great satisfaction to the student of physical geography that the whole subject of oceanic circulation is emerging from the speculative stage to that of scientific investigation.

This brief review of a rather technical and mathematical paper can give but a generalized summary of what is not only an important contribution to the world's knowledge of oceanography but also a fine example of the thoroughly scientific work being carried on at the Marine Biological Station at San Diego.

R. S. Holway.

OBITUARY

E. G. Ravenstein. This distinguished cartographer died in England in March. He was born at Frankfurt on Main on Dec. 30, 1834, and belonged to a family that for many years had been known as cartographers of high rank. At the age of twenty years he went to England and his ability as a cartographer obtained for him a position in the Intelligence Department of the War Office, which he filled from 1855 to 1872. Much of his preliminary training had been obtained as a pupil of the famous Dr. Petermann of Gotha, Germany; and Ravenstein had important influence in the improvement of British cartographical methods. He gave much of his time for several years to the compilation, for the Royal Geographical Society, of a large map of eastern Equatorial Africa, which was published in 1884. Though now nearly thirty years old this most careful work is indispensable to the student of the evolution of African geography. For several years he was a member of the Council of the Royal Geographical Society and was President of the Geographical Section of the British Association in 1891. Among his publications were "Vasco da Gama's First Voyage," published in 1898; a "Systematic Atlas," 1894, one of the best school atlases produced in any country; and "Martin Behaim, His Life and the Globe," 1908, the result of many years of research.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

The Awakening of the Desert. By Julius C. Birge. 429 pp. Ills. Richard G. Badger, Boston, 1912. $2. 8 x 5½.

A very readable book which records the experiences and observations of a highly intelligent and observant traveler. In recent years Mr. Birge has revisited many places included in his pioneer journey and his descriptions of present conditions as contrasted with those of nearly a half century ago add much interest to the narrative.

In the spring of 1886 Mr. Birge joined a company starting from Whitewater, Wis., with the object of carrying freight from the Missouri River to the "West," which, at that time, was "divided into plains, mountains and regions beyond." Starting with a train of 300 oxen, the party outfitted at Nebraska City and then took the Oregon Trail along the Platte River which, according to a humorous quotation, "could not be forded because it had a quicksand bottom, could not be bridged because it had no bottom for piers and could not be ferried for want of water." The caravan forded the river at high water and their experiences somewhat verified the ill repute of the Platte. At Fort Laramie they took the Mormon Trail to Salt Lake. About a fourth of the book records impressions and descriptions of Mormon life on which the judgment of the writer is, on the whole, favorable. The industry, thrift and sincerity of the rank and file of the Mormons receive repeated comment. From an earth science point of view, there is interest in the keen descriptions of the Bad Land topography near Scott's Bluff, the fossil bone beds of Wyoming which have since been so fruitful in scientific interest, the Wasatch Mountains and the Bonneville shore lines near Salt Lake.

F. V. EMERSON.

The Missions and Missionaries of California. By Fr. Zephyrin Engelhardt. Vol. 2: Upper California. Part 1: General History. xlvi and 682 pp. Map, ills. James H. Barry Co., San Francisco, 1912. $2.50. 9½ x 6.

Two elements which enter conspicuously into Friar Zephyrin's narrative somewhat militate against clarity of historical narrative, one theological, the other polemic in a literary sense. As a member of the order which brought the faith to Upper California more than a century ago, and with the faith colonization, he is under the necessity of defending his order. To the lay reader this seems useless; we may be proud of our own pioneer ancestors, yet their conduct at the fringes of civilization was certainly rude. So with the Franciscans. Acknowledging their great religious zeal at the present we should be willing to make allowances for their pioneer predecessors who had come through the turmoil of Mexico. Likewise Friar Zephyrin essays to correct Bancroft in the history of the Pacific Coast. It does not need argument to prove that no one man could have written the long line of volumes to which Bancroft attached his name. It was well known in San Francisco that he was the head of a history factory. In no sense is he taken as an authority on Californian history, and it is always necessary to confirm his citations on every point in which difference of interpretation of events might arise.

If the volume did not bear two such heavy burdens Friar Zephyrin's narrative of the founding of the missions would have proved far more interesting. As to its worth there can be no dispute; it is of great and enduring value. To its

pages every historian must turn for his information regarding those foci of settlement in Alta California whose names remain to the present day like a bede-roll. It is crowded with an enormous amount of minor information derived from the personal letters of the friars as well as from the official papers of the missions, and on the completion of the work it is hoped that a full index will render all this material available for reference. WILLIAM CHURCHILL.

Myths and Legends of California and the Old Southwest. Compiled and Edited by Katharine Berry Judson. xvi and 193 pp. Ills. A. C. McClurg & Co., Chicago, 1912. $1.50. 9 x 6½.

Miss Judson's Myths and Legends of California and the Old Southwest is the fourth in a series of volumes devoted to the myths of the Pacific Coast. In the space of 193 pages over 60 legends are presented briefly, interestingly and in attractive form. Over 50 illustrations, some not particularly appropriate, add picturesqueness to a pleasing volume.

The author has used the best sources for her material and has put into readable and available form a good collection of primitive literature, not accessible to the general reader because originally printed in little read official reports. The note of true religious feeling that is basal in every myth adds a charm that makes these simple tales of primitive culture most appealing.

RICHARD ELWOOD DODGE.

Attraverso gli Stati Uniti. Per l'emigrazione Italiana. Di E. Mayor des Planches. viii and 321 pp. Map, index. Unione Tip.-Editrice Torinese, Turin, 1913. L. 6. 9½ x 6.

This volume contains notes of travel, now making their first appearance in book form, although they were written when the author represented his country with distinction as Ambassador to the United States. They were published serially at that time in the *Nuova Antologia* and the *Rivista della Camera di Commercio Italiana* in New York. In view of the circumstance that Italian immigrants arriving in this country come, to such a large extent, from the south and belong to the agricultural class, Baron Mayor des Planches again suggests in this book, as he did in the articles six or eight years ago, that there are many places in the southern, south-eastern and western states to which a large part of the current of emigration from his country might be directed. He does not think that the war with Turkey will change the direction of Italian migratory currents. The region in northern Africa wrested from the Turks will not prove to be sufficiently attractive to colonists.

Alaska, the Great Country. By Ella Higginson. x and 537 pp. Map, ills., index. Macmillan Co., New York, 1912. $1.50. 7½ x 5½.

A narrative of travel well worth reading. If the descriptive matter and the ethnographical observations are as accurate as the place geography and the historical data seem to be, the book is most satisfactory from the descriptive point of view, and very profitable on the ethnographical side. It presents many graphic sketches of life and character, views of navigators, miners, missionaries, canners, Indians and half breeds. The student of glaciers, rivers and climate may cull from these brilliant pages many an illuminating item in his field. The chief charm, however, is in the vivid, direct portrayal of what the author saw, heard and felt in her three visits to Alaskan fiords, villages, glaciers, mining centers, rivers and mountains. She does not claim everything for "The Great Country," but possibly overestimates the coal as at present known; and she certainly has a friendly feeling for Alaska's often maligned climate.

G. D. HUBBARD.

Panama Canal Traffic and Tolls. By Emory R. Johnson. vi and 490 pp. Maps, index. Isthmian Canal Commission, Washington, 1912. 12 x 9½.

A valuable and timely publication. Pages 3 to 143 are devoted to traffic, and the subjects that receive most careful consideration are the following: Distances via the Panama Canal and alternative routes; tonnage of the vessels employed in the commerce that might have used the Panama Canal advan-

tageously in 1909–10; increase in available canal traffic, 1899 to 1914–15; relation of the Panama Canal to the traffic and rates of American railroads; the Suez, Kaiser Wilhelm, Manchester, and Amsterdam canals. On pages 145 to 211, devoted to tolls and revenue, the important subjects are: The basis or unit of toll levies upon merchant ships and war vessels; coaling facilities and coal costs via the Panama Canal and alternative routes; relation of tolls to the volume of traffic through the canal; Panama Tolls I: principles and considerations that should control in fixing tolls; Panama Tolls II: rates of toll—gross and net revenue. Appendices (pages 213–474), six page plates or charts, and twelve folded plates, contain information in abundance for the use of readers who may desire to make exhaustive studies of the main subject. Paragraphs which will probably be read with greatest interest at the present time are those beginning on page 201, summarizing the considerations that should control in fixing Panama tolls as follows: 1. In managing the Panama Canal and in fixing tolls, the usefulness of the waterway to commerce and industry should have first consideration. The policy as regards tolls and revenue should not be allowed to limit the traffic usefulness of the waterway. 2. The canal should be made commercially self-supporting. Tolls based upon the value of the service rendered by the canal are justifiable. . . . Tolls, not unduly restricting the commercial usefulness of the waterway, may be levied that will yield revenue enough to meet operation, maintenance, sanitation, government, annuity, and interest charges. 3. The same rate of toll should be charged upon American as upon foreign vessels.

Panama and the Canal To-Day. An historical account, etc. By Forbes Lindsay. New revised edition. xiii and 474 pp. Maps, ills., index. L. C. Page & Co., Boston, 1912. $3. 5 x 5½.

Mr. Charles Harcourt Forbes-Lindsay's "Panama, the Isthmus and the Canal" was published in 1906; the first edition of the present work in 1910. New matter in this revised edition will be found in the chapters devoted to the conditions under which the canal is to be operated and to an examination of the resources, etc., of the country, for the benefit of persons seeking information about the isthmus as a field for investment and enterprise. These chapters, wholly or partially new, may be commended as both useful and interesting. The entire work is uncommonly readable.

SOUTH AMERICA

Die heutige und die frühere Vergletscherung Südamerikas. Vortrag, gehalten auf der 83. Versammlung Deutscher Naturforscher und Ärzte zu Karlsruhe am 28. Sept., 1911. Von Wilhelm Sievers. Sammlung Wissenschaftl. Vorträge, 5. Heft. 24 pp. Maps, ills. F. C. W. Vogel, Leipzig, 1911. Mk. 2. 10 x 7.

The paper opens with a valuable historical sketch of glacial studies in South America. Alcide d'Orbigny appears to have been the first (1829) definitely to recognize past glaciation south of the equator—in the Bolivian Cordillera between Potosí and Chaqui. This work was not published, however, until 1842; the first published account is accredited to Alexander Brongniart (1833). To these were later added the observations of Darwin published in 1846, Acosta in 1851, and Philippi in 1862. In the last quarter of the nineteenth century the list grew rapidly until it became possible, as in the paper before us or as in the paper by Paschinger in *Petermanns Mitteilungen*, 1912, to outline the chief glacial features of the entire continent.

The results of Sievers's compilation show the great variety of glacial features in South America and the former existence of glaciers of every kind except the foreland or piedmont glacier of the Malaspina type. Our own observations in 1907 east of Cochabamba emphatically contradict Hauthal's conclusion, accepted by Sievers, that the eastern slopes of the Cordillera of Bolivia were not glaciated to elevations as low as the western. Our conclusion was confirmed in 1911 in crossing the Cordillera Vilcapampa. Sievers argues that the two factors—precipitation and temperature—are unequal in value and that the common assumption is unwarranted, that precipitation has a greater effect on the snow

line than temperature. But variations in topography may be more important than either precipitation or temperature in determining the elevation of the snow line.

Meyer concludes that there were two glacial epochs, Hauthal that there were three, an earliest epoch of vigorous glaciation and a latest of feeble glaciation. Steinmann holds that we may ultimately discover even more. Sievers distinguishes two glaciations in Peru, basing his conclusion upon the superposition of one morainic series upon another. While he admits the possibility and even the probability of the three glaciations of Hauthal, he holds that they are by no means established. Furthermore, he regards it as likely that the two last glaciations are synchronous with the Würm and Riss stages of Penck. He adds: "denn die Ähnlichkeit der glazialen Erscheinungen in Südamerika mit den europäischen liegt so sehr auf der Hand, dass an Gleichzeitigkeit, an gleicher Wirkung und an gleicher Dauer nicht mehr zu zweifeln ist." If we are correct in concluding that glaciation was contemporaneous in the two hemispheres, it follows in Sievers's view that the tectonic theory and the theory of a wandering pole may be definitely excluded from the list of working hypotheses. External causes must be invoked, as, for example, changes in the temperature of the sun and, therefore, in the intensity of solar radiation. ISAIAH BOWMAN.

South America. Painted by A. S. Forrest, described by W. H. Koebel. viii and 230 pp. A. & C. Black, London, 1912. Macmillan Co., New York. $5. 9 x 6½.

Seventy-five pictures in colors make the notable part of this book. Incidentally there are sections of text devoted to each of the countries of South America, including the Guianas. With a text of not more than 50,000 words to describe a whole continent, obviously only the most cursory view can be given. On the whole the text of "interest to the casual reader" seems to have been the one used in choosing subject matter. For example, out of 33 pages devoted to Argentina, 4 pages are given to narrating incidents happening along Calle Florida, Buenos Aires. This policy of selection has made the book light reading, entertaining, and, within its limits, instructive. Some mistakes are found, as in crediting Arica, Chili, to the province of Moquegua, Peru; and in stating that the falls of the Iguazú are on the "borders of Argentina and Paraguay." For the most part, however, the mistakes are not of vital consequence.

The pictures are interesting, if not entirely satisfactory. In some of them the coloring is poor, commonly because it is not true to the scene painted. For example, in the picture of Bahia (facing p. 66) the greens are nowhere near deep enough. In the view of the docks of Santos detail has been sacrificed to such an extent as to make the scene not at all like the reality. In other cases, notably in pictures of Rio, its harbor and the neighborhood, the reproductions fall far short of portraying the natural wonders of the landscape.

Forty-four of the pictures are of Brazilian scenes, found mainly from Bahia to São Paulo. Some of the subjects chosen make one wish that more consideration had been given to other parts of the continent. The whole Andine Highland, for example, is set aside with one unimpressive view. Anyone who expects to find South America as it is here portrayed will be surprised when the realities are encountered. The book does suggest, however, the very great possibilities of South America for the painter and photographer. WALTER S. TOWER.

L'Argentine telle qu'elle est. Par Paul Walle. 590 pp. Maps, ills. E. Guilmoto, Paris, 1912. Fr. 8.50. 9 x 5½.

In 1911, the author was delegated by the Minister of Commerce, of France, to prepare this volume, which is one of the most satisfactory books ever written about Argentina for the person who wants specific, reliable information. It is more of a handbook than a book of travel, and more largely descriptive than explanatory; but it unquestionably tells what the Republic is.

The first chapter is a description of Buenos Aires. Then follow about 120 pages devoted to a general survey of the country as a whole, covering such topics as the geography, historical and political relations, army and navy, finance,

industries, commerce, merchant marine, railroads, immigration, investments of European capital, public instruction, agriculture and grazing. Necessarily the treatment of any one of these topics is relatively brief, but in every case the salient points are covered; and in most cases, more or less detail of information is added.

The rest of the volume, 420 pages, is devoted to descriptions of the different provinces and territories, from 15 to 25 pages being devoted to each one. For each province or territory, surface, climate, vegetation, population, cities, resources and industries are discussed, while other items of special importance are included wherever appropriate, as, for example, notes concerning opportunities for colonists in the less densely settled sections. Remarkably well-chosen pictures, invariably typical of the region discussed, are found in every chapter, but, unfortunately, the quality of the paper has hurt the reproductions in numerous cases.

The information is thoroughly up to date. Thus, few of the statistics are earlier than 1911, except where used for purposes of comparison. In the text also are many items concerning very recent events, as in the statements concerning the extent of navigation on the Rio Bermejo; the discussion of the great irrigation project at Cuenca Vidal, in the Neuquen Valley, and the progress of the railroad across Patagonia, from San Antonio to Bariloche. Few details have escaped the author, as shown by the fact that he gives due notice of the success of coffee growing on the Leach Brothers' plantation at San Lorenzo, to the evidences of petroleum in the Laguna de Brea District, and so on. As a source of useful, dependable information the book cannot be too highly commended.

WALTER S. TOWER.

The Other Americans. The Cities, the Countries, and Especially the People of South America. By Arthur Ruhl. xi and 321 pp. Map, ills., index. Charles Scribner's Sons, New York, 1908. 8½ x 6.

A most fascinating book, in many places very humorous, often witty and on the whole very instructive. It is written wholly without pretense to learning, to erudition of any sort, still it contains a great deal of useful information presented in a most attractive way. The author has evidently seen the countries of which he treats, seen them rapidly, but well, and judges these countries and their inhabitants with fairness and as impartially as possible for one who comes from entirely different sections of the world and who consequently has been brought up in circles of ideas and customs totally distinct from those of so-called "Latin America." The leading thought of the author is to impress the readers that, since the name "America" has been given to and accepted generally as the name for the new continent (to use the term of the sixteenth century), North, Central and South, the people dwelling in the three sections should be acknowledged and treated as "Americans" and not only those living between Canada and Mexico. This idea strikes us as judicious, at least.

For geography this unpretentious book, well illustrated, is not without value. Nature and man are made to appear in the close and intimate contact which should never be overlooked. And, as the descriptions of the inhabitants are very true, so is nature presented in its true aspect, the pictures are neither overdrawn nor underdrawn, and the use of adjectives is judicious as well as moderate. This little book is neither a Baedeker nor a scientific book of travels, but a cinematograph most skilfully arranged, permeated by the impressions of a careful and impartial mind. Those who intend to travel through South America may find it a safer guide than more pretentious specimens of literature on the subject.

The Appendix is a prudently general review of the history and statistics of the parts of South America visited by the author. Possibly aware of the saying: "that there are three kinds of lies: the lie, the —— lie, and statistics," he has intrenched himself behind his sources, making them responsible for possible errors, which is the only proper way to do. To assume responsibility for statements not based upon original work, and in order to claim for oneself undue credit is an unsafe mode of proceeding too commonly indulged in, especially to-day.

A. F. BANDELIER.

Diccionario Chorographico, Historico e Estatistico de Pernambuco. Por Sebastião de Vasconcellos Galvão. 408 pp. Ills. Bibliotheca Nacional, Rio de Janeiro, 1910. 11 x 7½.

The author has given all his best efforts to this work since 1889. It is truly the work of a lifetime. Vol. 1 (A to O), published in 1908, contained 478 pages. Vol. 2, comprising only the titles beginning with the letter P, contains a long general article on the Brazilian State of Pernambuco—its history, biographical sketches of persons who have gained distinction in literature, art, and science (with portraits); administrators and officials from the earliest times; the geology and mineralogy of the State; an alphabetical list of vegetable products; a study of the entire coast of Pernambuco; commerce, industries, climate, etc. In a word, this article is, to a certain extent, a resumé of the information distributed throughout the "Diccionario" under separate titles. To give a just idea of the scope of the entire work, it is necessary to add that the author's plan for Vol. 3 (Q to Z) includes an exhaustive article on Recife (Pernambuco), particularizing the civil, political, ecclesiastical, and literary history of the State's capital. A map of Recife and its suburbs is also promised, and at the end of Vol. 3 there will be, if the plans are carried out, a bibliographical appendix devoted to Pernambucan authors and their books.

AFRICA

The Arabs in Tripoli. By Alan Ostler. With illustrations specially drawn by H. Seppings Wright. xii and 314 pp. John Murray, London, 1912. 10s 6d. 9 x 6.

Work of this sort is in essence occasional, but in the brief span of life which may be expected these sketches of the Italian war from the side of the desert will afford entertaining reading. It is too much to ask of a busy war correspondent that he should present finished conclusions. Upon the theme of the war itself he maintains a silence upon all the interesting points which his sense of the duties of hospitality requires him to conceal. He does not seek to dissemble the fact that his sympathies are with the Turk and the Arab. Just by reason of this attitude of mind he has been able to draw clear pictures of the sordid bravery of the tribes of the desert, of the hardships which fell to their lot, of the disease and starvation of the camps just beyond the range of the Italian guns. With a certain sense of sureness which lies quite beyond the power of students in the several sciences he includes in his narrative some definite settlements of questions of archæology, primitive ethnology and divinity. In a work done with so light a touch the student will find a tolerant excuse for the solution of the mystery of the Berbers through the intermediation of the Firbolg of Irish legend.

WILLIAM CHURCHILL.

Unsere Kolonien. Unter Mitwirkung hervorragender Afrikaner herausgegeben von Emil Zimmermann. 430 pp. Maps, ills. Ullstein & Co., Berlin, 1912. Mk. 3. 9½ x 6½.

Though sketchy this work is interesting. The author's aim has been to draw from many sources just that intimate information which shall serve to make the German colonies familiar objects to the German people. Colonies are a new development for the Germans. So recent is the colonial idea that the writer of this note has known the man who forced it upon Bismarck, Theodor Weber, Consul of the North German Confederation in the South Sea, and the source of many years of turmoil for the United States. In Germany there is room for such a book as this, a series of studies in which the Germans may become acquainted with their colonies. These offshoots of empire are dotted upon some of the richest lands in tropical and temperate Africa, upon the most productive islands of the Pacific, and in a position of strategic command upon the foreshore of China. Each of these colonies is well described, its discovery, history and settlement noted, its economic conditions somewhat carefully discussed. The work is not intended to be in competition with the reports of trained geographers and ethnologists, but it will be found of great assistance to those whose interest lies in the highly practical field of commercial geography.

WILLIAM CHURCHILL.

ASIA

Karakoram and Western Himalaya, 1909. An Account of the Expedition of H. R. H. Prince Luigi Amedeo of Savoy, Duke of the Abruzzi. By Filippo de Filippi. With a Preface by the Duke of the Abruzzi. xvii and 469 pp. Ills., appendices. Maps and plates in separate case. Constable & Co., Ltd., London, 1912.

In 1909 the Duke of the Abruzzi made an expedition to the Karakoram and the Western Himalayas, primarily for the purpose of establishing a new record in mountain-climbing. He also desired to ascertain how high it is physically possible for human beings to ascend, and whether there is a physiological limit above which men cannot climb. At the end of two months of persevering effort amid snow and ice he at least surpassed all previous records by 700 feet and reached a height of 24,600 feet on Bride Peak. This peak lies some twenty miles south of the famous K^2, 28,250 feet high, which was the first objective of the expedition. The region of K^2 was selected because the political conditions of Nepal prevent an attempt in that direction upon Everest, while Kichenjunga, the third of the world's chief mountains, has already been vainly attempted and is less favorable than K^2 in other respects. If high climbs can be made in any part of the world it should be in the Karakoram region, for there the number of peaks rising over 23,000 feet is probably larger than anywhere else in the world.

On his mountaineering expeditions the Duke of the Abruzzi manages all the details in person, and is at the fore-front whenever a mountain is attacked. He makes little attempt, however, to work up results, leaving that to the group of Italian friends whom he takes with him. One of these, Signor de Filippi, a physician, has written the sumptuously bound book under review, while another, Signor Sella, has illustrated it with some of the finest photographs and panoramic views ever taken. The book as a whole is a straight-forward, unvarnished, very painstaking account of the details of the trip day by day. Nearly half of it is devoted to the route from Kashmir to the Indus River and thence to the Baltoro Glacier, where the real mountaineering began. This route has been often followed and is well known to students of the Himalayas. It is not to be expected that an author who is not a field scientist should be able to record much that is new. De Filippi is probably wise in merely describing what he saw and rarely attempting to explain it, except by citing the opinions of others. One of the few cases where he expresses his own views is in regard to the origin of the huge alluvial terraces of the Indus and its tributaries, which are thought by some to be due to climatic variations and by others to telluric movements. De Filippi inclines to the climatic hypothesis.

When the last villages were reached several hundred Balti coolies were engaged to carry the provisions and equipment up into the glaciers. It is pleasant to hear the good opinion which the Italian explorers formed of the Baltis. Sometimes the coolies were afraid, as any man might be where his life is continually in danger. Nevertheless, they stuck to their work and proved reliable through the whole journey. Their cheerfulness under difficulties is notable. Some of them went with the Duke to an altitude of 20,000 feet, although the main work fell upon a party of Swiss guides. The origin of the Baltis is another of the questions upon which de Filippi expresses an opinion. He believes them to be of Aryan stock, and not Mongolian, as is often stated.

As speedily as possible the expedition proceeded up the great Baltoro Glacier to the foot of K^2, sometimes known as Mount Godwin Austin. Repeated attempts were made to ascend the mountain from all sides except the north, where it was already known to be inaccessible. In every case, however, vast walls of solid ice or other impassable obstructions brought the climbers to a halt at altitudes of about 22,000 feet. Day after day the storms were so severe as to prevent all work, and the longest period of clear weather was only three days. This did not come until after K^2 had been abandoned and the party was on its way to make an attempt upon Bride Peak, 25,110 feet high. Here the difficulties proved less. A camp was pitched at the extraordinary altitude of 22,483 feet and a maximum elevation of 24,600 feet was reached.

During all their journeyings back and forth the Italians made careful obser-

vations of the movements of the ice, its method of fracture, the distribution and composition of moraines, and the state of the atmosphere. All of these, together with innumerable descriptions of mountain scenery, are set forth in detail. The phases of the volume which hold the attention, however, are the wonderful pictures, and the self-control with which the Italians stuck to their work while in the field and refrain from boasting of their success now that they have returned.

The achievement of this expedition brings renewed evidence to show that the attainment of high altitudes, while in part a matter of abundant means, adequate equipment and trained mountaineers, is still more a question of steady persistence and wise planning. If K^2 or Everest were among the Alps, as Filippi well says, it is probable that they would be climbed within a few years; but their remoteness, the necessity of a hard journey of two or three months to reach even their base, and the frequent storms of summer or the low temperature of winter, are almost insuperable obstacles. Hence, we cannot say with certainty that they ever will be climbed. There does not seem, however, to be any physiological reason why this should be so. "The Duke's expedition," to quote de Filippi, "offers the clearest proof that men can live for extended periods of time, in possession of healthy functional activity of all their organs, at an atmospheric pressure little more than half of normal. Twelve Europeans and fifteen coolies lived for about two months at above 17,000 feet of altitude, working regularly and not showing a single case of illness, even of the most fleeting character, attributable to mountain sickness." ELLSWORTH HUNTINGTON.

Patriarchal Palestine. Canaan and the Canaanities before the Israelitish Conquest. By the Rev. A. H. Sayce. 254 pp. Map, index. Soc. for Promoting Christian Knowledge, London, 1912. 4s. 8 x 5.

This is a revised edition of a work printed in 1895, when Palestine excavation was in its beginnings. Little was then known of the history of the country prior to the invasion of the Israelitish people. Since that time the decipherment of monuments in Babylonia, Assyria, Egypt and Palestine has made clear much of this ancient history. The author is perhaps too eager to assert the unqualified historical character and Mosaic authorship of the Pentateuch and dismisses with sweeping denial the conclusions of higher criticism, as set aside by archæological discoveries. At the same time he sets up the traditional belief of the Jewish and Christian church concerning these matters as authority to which unquestioning heed must be given.

A few of the leading facts of the physical geography are reviewed in the opening chapter on the land. An account of the native tribes is then given, followed by an extended chapter on the Babylonians in Canaan. The story of the Patriarchs is told, adding little, however, to the narrative of Genesis, except in emphasis on one point, *viz.*: that Abraham found the country of his adoption full of the ideas and people of Babylonia. The relations of Palestine to Egypt are recounted and there is reference to the general geographical situation of the land, and its significance, but without special enlargement of our outlook on this theme. The closing account of Canaanitish culture and religion and of the results of recent excavations come nearer than other parts of the volume to meeting the anticipations of interest aroused by the title.

A. P. BRIGHAM.

The Chinese. By John Stuart Thomson. 441 pp. Ills., index. Bobbs-Merrill Co., Indianapolis, 1912. 9 x 6.

In this volume we have the pretentious record of what seem to be the gatherings of one who was engaged upon the clerical side of commercial operations in the treaty ports. In places it reads with as little connection as if it were the transcription of notes jotted down on library cards and assorted under any one of a dozen general headings. It is superficial: there is no pretense to look under the surface, embroidered or squalid, of Chinese life to obtain a comprehension of the nature of this oldest of the civilized societies. The value of these notes must be determined by our estimate of the capability of the observer, for the witness must always be an integral part of his testimony. We note a few points which are germane to the examination of the witness. On his page 15 he mentions

an Anglican bishop wearing a "sun-topy"; this is an oddity of etymology, for the sola topi derives its name from the Indian word sola, which is the name of the plant whose pith is used in these very light helmets; thence the English have mistakenly spelled it solar topi and now we see the mistake translated into English. Within a few lines the author misuses "of his ilk" in complacent ignorance of the sense. On page 24 he speaks of the rat and the flea as "transmitters of the virulent bubo bacillum," and whether he uses Latin or leaves it alone he seems equally destined to fail. On page 40 he shows how little he can record what he sees; after describing the homeless as sleeping on the pavements "on their backs with knees up" he continues with a note that the police "belabor every stretched out, upturned foot," a thing which would be found particularly difficult in such a pose. Two pages onward, continuing the police theme, he notes "their ability to roll diphthongs and the letter r," — the rolling diphthong is certainly a curiosity of philology. Again he tries the Latin; in commenting on the interpretation of the imperial banner where the dragon is forever vainly gobbling after the blue pearl he writes: "this is not meant to convey the futility of empire, but rather our idea of *Exsertens, perpetua,*" whatever our idea may be. It is a work which may properly be disregarded by serious students and which will probably mislead into serious error those who are not fitted to evaluate its statements. However, this gem from page 216 will add to the joy of the students of metaphor: "She gave birth to Japan and threw that people safely into a glorious orbit of its own, the heat of which is now reciprocally warming a new spring into being as it swings near its parent orb." WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

Reports of the Cambridge Anthropological Expedition to Torres Straits. Vol. 4: Arts and Crafts. xxiii and 393 pp. Map, ills. University Press, Cambridge, 1912. G. P. Putnam's Sons, New York. £1 5s. 11½ x 9.

This is a monument to the indefatigable industry of Dr. Haddon, the director of the expedition, for no less than 14 of the 18 essays bear his name as author and in all but two he has had a co-operating share. As heretofore, a considerable amount of the illustration is derived from draughtsmen of the islands, a very valuable factor in the study of design and ornament to which Dr. Haddon has devoted so much attention. Thus we obtain further instances of the mirror drawing which seems to bear upon the little comprehended theme of rotation in vision, a theme which has escaped careful study in the lack of sufficient data. The islands of Torres Straits are a focus of the very interesting cats-cradle. This reaches a high stage of development in Hawaii, is found throughout Polynesia, is scantily practiced in Melanesia but here reappears in full force. No less than thirty-one intricate patterns are here given in text and pictures, accompanied by the songs with which the manipulation of the cord is attended. In the preparation of this essay so much tributary material was gathered and elaborated by Dr. Haddon's daughter that she has published a separate monograph upon the cats-cradle and other amusements with string. Another of these essays has great value, that upon music by Charles S. Myers resting upon a large number of phonographic records; the vocal sounds have been carefully established in reference to the musical scale now in civilized use and the theory of intervals sedulously worked out; the only lack which we note is that too little attention has been paid to the long final note with which each song ends. The implements of peaceful and warlike art occupy a large space and the description of their manufacture and employment rests upon prolonged narratives by the folk who make and use them. In connection with the beheading knife of bamboo, students of comparative culture will be surprised to discover how among these savages the notching of the knife for each man killed arises from the nature of the material. WILLIAM CHURCHILL.

Easter Island. The Rapanui Speech and the Peopling of Southeast Polynesia. By William Churchill. 340 pp. Index. Publication No. 174, The Carnegie Institution, Washington, 1912. 10½ x 7.

The *Journal of the Polynesian Society* (Vol. 21, 1912, No. 4) says that Polynesian scholars are placed further under a debt of gratitude to Mr. Churchill by the issue of this volume on a very interesting branch of the widely spread

Polynesian language. In this work the author carries forward his studies in Polynesian linguistics, all intended to lead up to his proposed work on "the Proto-Samoan" as illustrated by his extensive collection of traditions and notes. This latter work has been the study of the author for fifteen years, and its appearance will be awaited with keen interest by all who are interested in Polynesian matters.

Mr. Churchill leads up to the Easter Island vocabulary by an exhaustive study of the dialects that are geographically its neighbors, and this is done in a manner approached by no similar writings on other groups excepting in Mr. Churchill's own work "The Polynesian Wanderings." He is giving an enormous amount of labor to his task. The number of tables in which his comparisons are represented by figures and words is astonishing. Each of them means a close study of the words of several dialects.

Briefly, here are the conclusions at which Mr. Churchill arrives: "In the four languages of the province * there is a wide speech-group of broad diffusion and considerable complexity. . . . One element of unknown antiquity, a corpus of Polynesian speech summed at 16,000 vocables, has passed from the use of others of the race. We find reason to consider this due to a Proto-Samoan settlement of uncertain date, but very probably coincident with the first arrival of that migration swarm within the central Pacific after the divaricated Melanesian traverse. Upon this settlement was overlaid a migration of a later Proto-Samoan colony, refugees from Tongafiti tyranny, at a period, therefore, of probably the year 1250. At the same time a third settlement was made upon these parts, the Tongafiti pursuit of Proto-Samoan fugitives.

"At a later period there entered the province, undoubtedly from leeward as is the impulse of all Polynesian folk movement, a migration representing a different phase . . . this later migration was caught in the Paumotu chain; only its stragglers, few in number, reached the other archipelagos. In time the voyage was resumed . . . out on unknown seas towards the rising. Only a small portion of any fleet could have made port in Rapanui, the last home of the Polynesian race. For the rest, submergence. That this migration is the most recent in the province is shown by the fact that wherever found the Rapanui element still retains in sharp distinction its characteristic features."

This work is of first importance to all who are interested in the migrations of the Polynesian race and linguistic questions relating to the Polynesians.

EUROPE

Die Insel Madeira. Photographische Wiedergabe einer Reliefkarte zur Erläuterung des vulkanischen Baues dieser Insel. Mit einem Begleitwort von Alphons Stübel. Nach dessen Tode herausgegeben von W. Bergt. v and 11 pp. Maps, ills. Veröffentl. des Städt. Mus. für Länderkunde zu Leipzig, 11. Heft. Max Weg, Leipzig, 1910. 14 x 11.

There is something highly appropriate in the publication of this work as a memorial of the great vulcanologist, for it was at Madeira that Stübel began his studies which in the end carried him to far lands. Years ago he prepared this relief map of Madeira; always it remained among the things which he should do when opportunity served. But always new areas in his great theme called him to greater discovery; the relief map of Madeira was completed in its model, the occasion never served when he could write the text of the monograph which in plan it was designed to illustrate. Now it has been published in reduced facsimile as the eleventh item in the series of papers celebrating his zeal for the enrichment of the Leipzig Museum of Geography. The coloring of the relief and the diacritical designation of areas exhibit quite clearly what would have been his theory of the geognostic development of the island. His editor has assembled from correspondence and from manuscripts of field notes all the material which remains from Stübel's studies upon the spot and thus is able to reconstruct, at least in skeleton, the monograph which never was written. Even in this mutilated state the contribution will be found of great value to those who would examine the history of the formation of this island.

WILLIAM CHURCHILL.

* Tahiti, Marquesas, Paumotu and Gambier.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

LES FRANÇAIS AU CANADA. Par Le Lieutenant-Colonel Picard. Series: Pages d'Histoire. 164 pp. Map, ills. Les Arts Graphiques, Vincennes, 1912. 8 x 6. [An account of French colonization in Canada. Its failure ascribed principally to lack of support from the home government. Planned for young readers.]

SOUTH AMERICA

CHILE. By D. W. Caddick. 64 pp. Arthur H. Stockwell, London, 1912 (?). 1s. 7 x 5.

ON THE GEOLOGICAL STRUCTURE AND HISTORY OF THE FALKLAND ISLANDS. By T. G. Halle. 112 pp. Map, ills. Reprinted from Bull. Geol. Inst., Univ. Upsala. Vol. XI. Almquist & Wiksells, Upsala, 1911. 10 x 7. [Lithologic and paleontologic evidence considered. Tectonic outlines of the islands established as regards leading features. Remarks on Permian geography. Discusses changes of level of the islands without contributing definite data towards positive knowledge of Quaternary submergence.]

AFRICA

EN MARRUECOS. Por Pablo E. Nieto. 263 pp. Ills. Sociedad General De Publicaciones, Barcelona, 1912. 7½ x 5½.

ALGÉRIE. Par Brieux. Series: Les Beaux Voyages. 115 pp. Map, ills. Les Arts Graphiques, Vincennes, 1912. 8 x 5½.

STORIA DELLA CONQUISTA DELL'ALGERIA. Di G. Quesnel. 128 pp. A. Quattrini, Firenze, 1912. L. 0.50. 6½ x 4.

ALGÉRIE-TUNISIE. Par Gilbert Jacqueton et Stéphane Gsell. Collection des Guides-Joanne. lv and 412 pp. Maps, plans. Hachette & Cie., Paris, 1911. Fr. 12. 6½ x 4. [The mass of information in the previous editions has been supplemented by a notable increase of maps in the present issue.]

ALGÉRIE TUNISIE. 4th edition. Series: Guides Pratiques Conty. xx and 404 pp. Maps, index. Administration Des Guides Conty, Paris, 1912 (?). Fr. 5. 5½ x 3½. [A chapter on motor-car roads and itineraries with maps has been added to this edition.]

À TRAVERS LE CONGO BELGE. By R. Dubreucq. 83 pp. Maps, ills. L'Expansion Belge, Bruxelles, 1909. Fr. 2. 11 x 8. [A brief review of the growth of, and present conditions in, the Belgian Congo by a colonial official of wide African experience.]

ASIA

THROUGH SIBERIA. An Empire in the Making. By Richardson L. Wright and Bassett Digby. 261 pp. Map, ills. McBride, Nast & Co., New York, 1913. $2. 8½ x 6. [The clear, attractive style and numerous photographs readily impart a general understanding of the country, its inhabitants and their activities.]

DIE ARAMÄER. Historisch-Geographische Untersuchungen. Von Dr. Sina Schiffer. xii and 207 pp. Map, index. J. C. Hinrich, Leipzig, 1911. M. 7.50. 9 x 6. [The first compilation dealing with the historical and geographical aspects of this race's development. Sources exhaustively worked up.]

PICTURESQUE NEPAL. By Percy Brown. xvi and 205 pp. Map, ills., index. A. & C. Black, London, 1912. $3. 8½ x 6. [Results of the author's study of the artistic monuments of the Nepal valley.]

AUSTRALASIA

THE TIN-MINING INDUSTRY AND THE DISTRIBUTION OF TIN ORES IN NEW SOUTH WALES. By J. E. Carne. Series: Mineral Resources, No. 14. 378 pp. Maps, ills., index. Dept. of Mines, Geological Survey, Sydney, 1911. 5s. 9½ x 6. [A monograph which is thoroughly to the point. Geology, mining and metallurgy of the stanniferous ores described in detail. Replete with data of technical value, many of which may be profitably applied in practice outside of New South Wales.]

THE NEW ZEALAND OFFICIAL YEAR BOOK, 1912. Prepared under the instructions of The Government of New Zealand by M. Fraser. xii and 957 pp. Index. The Government of New Zealand. Wellington. 8½ x 6.

EUROPE

FORFARSHIRE. By Easton S. Valentine. 160 pp. Maps, ills.; Middlesex. By G. F. Bosworth. ix and 165 pp. Maps, ills.; Rutland. By G. Phillips. x and 171 pp. Maps, ills. Series: Cambridge County Geographies. Cambridge University Press, 1912. G. P. Putnam's Sons, New York. 45 cents each. 7½ x 5. [The varied aspects of the surface of each of these counties are described in graphic and interesting paragraphs in the style that has won just commendation for the previously published readers of this series.]

ENGLANDS WELTMACHT IN IHRER ENTWICKLUNG VOM 17. JAHRHUNDERT BIS AUF UNSERE TAGE. Von Wilhelm Langenbeck. 2. Auflage. In series: Aus Natur und Geisteswelt, 174 Bändchen. viii and 123 pp. B. G. Teubner, Leipzig & Berlin, 1913. Mk. 1.25. 7½ x 5. [An improved edition. The geographical basis of England's world might is recognized.]

DIE EIFEL. Von Otto Zollman. 126 pp. Maps, ills., index. Die Norddeutscher Moore. Von Bruno Tacke und Bernhard Lehmann. 147 pp. Maps, ills., index. Series: Land und Leute, Monographie zur Erdkunde. Velhagen & Klasing. Bielefeld and Leipzig, 1912. Mk. 5 each. 10 x 7 each. [Two splendid specimens of regional description which are free from cramming with a mass of erudition that would render them unsuitable for general readers. None the less thoroughly scientific for being written in a popular form. Presentation in a style that is bound to awaken interest in geography. Copiously illustrated with critically selected photographs.]

UNKNOWN SWITZERLAND. By Victor Tissot. xi and 371 pp. Ills. James Pott & Co., New York, 1905. $2. 7½ x 5. [Brimful of legends portraying the simplicity of customs and beliefs in the lesser known portions of Switzerland. Descriptions of scenes and people bespeak intelligent observation. Admirably illustrated by photogravures.]

VERKEHRSGEOGRAPHISCHE STUDIEN ZU EINER ISOCHRONENKARTE DER ÖSTERREICHISCH-UNGARISCHEN MONARCHIE. Von Dr. Franz Heiderich. Series: Publikationen der Exportakademie. 48 pp. Map. Verlag der Export-Akademie des K. K. Österr. Handelsmuseums. Wien, 1912. 9 x 6. [A model geographical treatment of the value of transportation in relation to ordinary transactions of modern commerce. The map accompanying the work contains the data and conclusions of the text. The time element revealed thereon, together with the regional element, constitutes a factor of the utmost practical significance.]

OLD HOMES OF NEW AMERICANS. By F. E. Clark. xxvii and 265 pp. Ills., index. Houghton, Mifflin Co., Boston and New York, 1913. $1.50. 8 x 5¼. [A description of the Austro-Hungarian provinces which contribute the largest number of emigrants to the United States. Brightly written in a way to convey an insight into many causes of this emigration.]

LES FORÊTS PYRÉNÉENNES. Par A. Campagne. xi and 190 pp. Map. Lucien Laveur. Paris, 1912. Fr. 3. 10 x 6¼. [Boundaries of the Pyrenean region given. Condition of, and changes in, the wooded areas during historical times. Present economic phase of the question considered.]

THE ITALIANS OF TO-DAY. By Richard Bagot. iii and 248 pp. F. G. Browne & Co., Chicago, 1913. 8 x 5. [Their life and peculiarities explained in chapters of engrossing interest.]

EUROPA. By A. Vermast. Series: Aardrijkskunde. 200 pp. Maps, ills. I. Vanderpoorten, Ghent, 1912. Fr. 2. 9 x 6. [A new edition. The geography of Europe is described so as to give prominence to the causal elements underlying the scientific facts without departing from the popular form in which the book is written.]

PRINCIPLES OF PRUSSIAN ADMINISTRATION. By H. G. James. xiv and 309 pp. Index. Macmillan Co., New York, 1913. $1.50. 8 x 5¼.

GENERAL

LE DRY-FARMING. Par John A. Widtsoe. Traduit de l'Anglais par Anne-Marie Bernard. 2nd edition. Series: Bibliothéque Agricole. xxxvi and 304 pp. Map, ills. Librairie Agricole de la Maison Rustique. Paris, 1912. Fr. 3.50. 7½ x 4½. [This translation of a well-known American work was published under the auspices of the "Government Général de l'Algérie" mainly because of the high value of the results of American practice as applicable to conditions existing in the French possessions of North Africa.]

GEOLOGISCHES WANDERBUCH. Von Karl G. Volk. Für mittlere und reife Schüler. 1. Teil. In series: Dr. Bastian Schmids naturwissenschaftliche Schülerbibliothek. 294 pp. Ills., index. B. G. Teubner, Leipzig, 1911. Mk. 4. 8 x 5½. [A useful companion for young field geologists.]

PROCEEDINGS OF THE SOCIETY OF ANTIQUARIES OF LONDON. Session 1911–1912. 2nd Series, Vol. XXIV. vi and 352 pp. Map, ills., index. Soc. of Antiquaries, Oxford, 1912 (?). 9 x 6.

ARCHAEOLOGIA OR MISCELLANEOUS TRACTS RELATING TO ANTIQUITY. Vol. LXIII. 2nd Series: Vol. XIII. xvi and 354 pp. Maps, ills., index. Soc. of Antiquaries, Oxford, 1912. 12 x 10. [Papers mainly devoted to researches in the British Isles.]

OBED HUSSEY. Edited by F. L. Greeno. Ills. 228 pp. Rochester, N. Y., 1912. 8 x 5.

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

United States

ASHLEY, G. H., AND M. R. CAMPBELL. Geologic Structure of the Punxsutawney, Curwensville, Houtzdale, Barnesboro, and Patton Quadrangles, Central Pennsylvania. 23 pp. Map, diagrams. *U. S. Geol. Surv. Bull. 531–D.* 1913.

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STANIFORD, C. W. Report on the Disposal of City Wastes. With Accompanying Map Showing Opportunities for Disposition. 18 pp. Dept. of Docks and Ferries, New York City, Feb., 1913.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets
(Including Combined and Special Topographic Maps)

CALIFORNIA. (a) Chico Landing Quadrangle. Surveyed in 1904 and 1910. 1:31,680. 39°45′0″ - 39°37′30″ N.; 122°0′0″ - 121°52′30″ W. Contour interval 5 ft. Edition of Nov. 1912.

(b) Durham Quad. Surveyed in 1910. 1:31,680. 39°45′0″ - 39°37′30″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of Nov. 1912.

(c) Marysville Buttes Quad. Surveyed in 1909–1911. 1:31,680. 39°15′0″ - 39°7′30″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft., between broken contours, 500 ft. Edit. of Nov. 1912.

(d) Palermo Quad. Surveyed in 1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 121°37′30″ - 121°30′0″ W. Interval 5 ft. Edit. of Dec. 1912.

(e) Pennington Quad. Surveyed in 1908–1910. 1:31,680. 39°22′30″ - 39° 15′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. [between broken contours, 500 ft.]. Edit. of Nov. 1912.

[Maps (a) to (e) belong to the two-inches-to-the-mile sheets of the Sacramento Valley. On map (b) town of Chico shown, affording, because of the relatively large scale, a more than usually useful representation of the built-up area of a town. On maps (c) and (e) the use of a 5-foot contour interval below, and of a 500-foot interval above 300 ft. elevation (an indication omitted from the legend on map (e)) makes the Marysville Buttes appear to be flat-topped mesas.]

(f) Salinas Quad. Surveyed in 1908–1910. 1:62,500. 36°45′ - 36°30′ N.; 121°45′ - 121°30′ W. Interval 50 ft. Edit. of Oct. 1912.

[Woods shown in green.]

COLORADO. Castle Rock Quad. Surveyed in 1911. 1:125,000. 39°30′ - 39°0′ N.; 105°0′ - 104°30′ W. Interval 100 ft. Edit. of Feb. 1913.

HAWAII. Topographic Map of the Island of Kauai, Kauai County, Hawaii. Surveyed by the U. S. Geological Survey in Co-operation with the Territory of Hawaii. Surveyed in 1910. 1:62,500. 22°15′ - 21°50′ N.; 159°50′ - 159°15′ W. Interval 50 ft. Edit. of 1912.

[The first map of this island of the Hawaiian group to represent relief adequately, for neither the large-scale maps of the Hawaiian Government Survey of 1886 nor those of the General Land Office can lay claim to this characterization. The relatively small contour interval chosen (the elevations range from 0 to 5,000 ft.), coupled with the excellence of the survey, makes for an unusually delicate rendering of relief. District boundaries and names are shown in red, boundaries and names of forest reserves in green.]

ILLINOIS. Kimmswick Quad. Surveyed in 1910. 1:62,500. 38°30′ - 38°15′ N.; 90°30′ - 90°15′ W. Interval 20 ft. Preliminary edit. of Nov. 1912.

[Missouri part of sheet, constituting two-thirds of it, is blank. The town giving the sheet its name is not shown as it lies in Missouri.]

ILLINOIS-IOWA. Milan Quad. Surveyed in 1910. 1:62,500. 41°31.5′ - 41° 15.0′ N.; 90°45′ - 90°30′ W. Interval 20 ft. Edit. of Oct. 1912.

[Towns of Rock Island and Moline included. Woods shown in green.]

IOWA. Pella Quad. Surveyed in 1909–1910. 1:62,500. 41°30′ - 41°15′ N.; 93°0′ - 92°45′ W. Interval 20 ft. Edit. of Dec. 1912.

[Woods shown in green.]

LOUISIANA. (a) Ashton Bridge Quad. Surveyed in 1909. 1:31,680. 33°-0′0″ - 32°52′30″ N.; 91°22′30″ - 91°15′0″ W. Interval 5 ft. Preliminary edit. of Dec. 1912.

(b) Millikin Quad. Surveyed in 1909. 1:31,680. 33°0′0″ - 32°52′30″ N.; 91°15′0″ - 91°7′30″ W. Interval 5 ft. Preliminary edit. of Jan. 1913.

[Belong to the series of two-inches-to-the-mile maps of the alluvial valley of the Mississippi. Woods shown in green.]

MISSISSIPPI. (a) Hollywood Quad. Surveyed in 1908. 1:31,680. 34° 45′0″ - 34°37′30″ N.; 90°22′30″ - 90°15′0″ W. Interval 5 ft. Preliminary edit. of Jan. 1913.

(b) Lula Quad. Surveyed in 1908. 1:31,680. 34°30′0″ - 34°22′30″ N.; 90°30′0″ - 90°22′30″ W. Interval 5 ft. Preliminary edit. of Dec. 1912.

(c) Moon Lake Quad. Surveyed in 1908. 1:31,680. 34°30′0″ - 34°22′30″ N.; 90°37′30″ - 90°30′0″ W. Interval 5 ft. Preliminary edit. of Dec. 1912.

[Belong to the series of two-inches-to-the-mile maps of the alluvial valley of the Mississippi. On maps (b) and (c) woods shown in green. The northwest corner of map (a), the northeast corner of map (b) and the greater part of the western half of map (c) are blank.]

MISSISSIPPI-TENNESSEE. Lake Cormorant Quad. Surveyed in 1908. 1:31,680. 35°0′0″ - 34°52′30″ N.; 90°17′30″ - 90°10′0″ W. Interval 5 ft. Preliminary edit. of Dec. 1912.

[Also one of the two-inches-to-the-mile sheets of the alluvial valley of the Mississippi. Woods in green. Western third and northeast corner blank.]

MONTANA. (a) Chelsea Quad. Surveyed in 1908-10. 1:62,500. 48°15′ - 48°0′ N.; 105°30′ - 105°15′ W. Interval 20 ft. Edit. of Nov. 1912.

(b) Hay Creek Quad. Surveyed in 1909. 1:62,500. 48°30′ - 48°15′ N.; 105°15′ - 105°0′ W. Interval 20 ft. Edit. of Nov. 1912.

(c) Poplar Quad. Surveyed in 1909–10. 1:62,500. 48°15′ - 48°0′ N.; 105°15′ - 105°0′ W. Interval 20 ft. Edit. of Oct. 1912.

(d) Smoke Creek Quad. Surveyed in 1909. 1:62,500. 48°30′ - 48°15′ N.; 105°0′ - 104°45′ W. Interval 20 ft. Edit. of Dec. 1912.

MONTANA-IDAHO. Missoula Quad. Surveyed in 1907–1909. 1:125,000. 47°0′ - 46°30′ N.; 114°30′ - 114°0′ W. Interval 100 ft. Edit. of Oct. 1912.

OREGON. Halsey Quad. Surveyed in 1909–1910. 1:62,500. 44°30′ - 44°15′ N.; 123°15′ - 123°0′ W. Interval 10 ft. and 25 ft., changing on the 500-foot contour. Edit. of Dec. 1912.

[Woods shown in green.]

PENNSYLVANIA. Hilliards Quad. Surveyed in 1909 and 1910. 1:62,500. 41°15′ - 41°0′ N.; 80°0′ - 79°45′ W. Interval 20 ft. Edit. of Dec. 1912.
[Woods shown in green.]

TENNESSEE. Crossville Quad. Surveyed in 1910. 1:62,500. 36°0′ - 35°45′ N.; 85°15′ - 85°0′ W. Interval 20 ft. Edit. of Nov. 1912.
[Covers the same territory as the northeast quarter of the old Pikeville sheet, 1:125,000, surveyed in 1886 and 1890. A comparison of the present sheet with the corresponding part of the older sheet well illustrates the great improvement in the surveying methods of the U. S. Geological Survey since that time.]

TEXAS. (a) Buckholts Quad. Surveyed in 1909. 1:31,680. 30°52′30″ - 30°45′0″ N.; 97°15′0″ - 97°7′30″ W. Interval 5 ft. Edit. of Nov. 1912.
(b) Courtney Quad. Surveyed in 1910. 1:31,680. 30°22′30″ - 30°15′0″ N.; 96°11′0″ - 96°3′30″ W. Interval 5 ft. Edit. of Nov. 1912.
(c) Rockwell Quad. Surveyed in 1909. 1:31,680. 33°0′0″ - 32°52′30″ N.; 96°35′0″ - 96°27′30″ W. Interval 5 ft. Edit. of Dec. 1912.
[Map (a) covers a small part of the area shown on the Taylor sheet, 1:125,000, surveyed in 1885. The western two-thirds of map (b) coincides with the extreme northeast corner of the Dallas sheet, 1:125,000, surveyed in 1889. Woods shown in green on all three sheets.]

NORTH AMERICA

UNITED STATES

ARIZONA. Clason's Industrial Map of Arizona. Mineral Features by Cyrus Fisher Tolman, Jr., Arizona School of Mines. (1908.) [1:770,000.] 7 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[One of a series of seven maps entitled "Industrial [*i.e.*, Economic] Maps of the Rocky Mountain States," published by the above firm, which includes, besides Arizona, Colorado, Idaho, Montana, New Mexico, Utah and Wyoming (see the entries below). They are especially valuable for their representation of economic features, mainly mineral and agricultural. Otherwise they resemble in general appearance the corresponding state maps of the General Land Office in that they show county boundaries, forest reserves, Indian reservations, etc., in a similar manner. But they contain a far greater wealth of topographical detail than these, being evidently based on the original township plats and other surveys. On all of the maps wagon roads and trails are shown; relief is shown by simple hachuring in black on the maps of Arizona, New Mexico and Utah and by shading in brown on the map of Idaho: no relief is shown on the other maps. On the margin of all the maps is printed a list of towns with elevations; on some, additional statistical information is given. The wealth of content exhibited by these maps is coupled with an accuracy of compilation which is quite unusual in the products of private map publishing firms in this country.
The map of Arizona shows by color irrigated lands in green and the copper bearing region of southeastern Arizona in orange. Mineral occurrences (gold, silver, copper, lead, zinc) are shown by red symbols.]

CALIFORNIA. Relief and Mineral Map of California Showing the Topography and the Approximate Locations of all the Principal Mineral Deposits, Together with Statistics of Mineral Production. Also Map Showing the Comparative Area of California with Other States. Issued by the California State Mining Bureau, Ferry Building, San Francisco. Lewis E. Aubury, State Mineralogist. 1908. [Three maps, viz., (1) Relief Map, 1:2,100,000, 1 color; (2) Mineral Map, 1:2,100,000, 6 colors; (3) Map Showing Comparative Areas, 1:9,000,000.]

[Map (1) a photograph of a relief model. On map (2) the following are distinguished by colors: principal gold producing areas, copper deposits; quicksilver deposits, oil fields, gas wells, coal mines; saline deposits: borax, salt and soda. Map (3), while purporting to show the comparative areas of ten other states whose aggregate area is practically equivalent to that of California by superimposing their outline upon that of California, fails to do so in that these outlines of other states have been so drawn as to fit into the outline of California, and the comparative criterion of identical scale has thus been sacrificed.]

COLORADO. Clason's Industrial Map of Colorado. (1913.) [1:660,000.] 6 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[See comment under "Arizona." Irrigated lands shown in green, auriferous area in yellow, coal fields in gray, with outcrops in red. Location shown, by distinctive symbols, of mines producing gold, lead, vanadium, silver, zinc, iron, copper, tungsten and marble. Relief not shown. List of principal mountains, with altitudes, and list of rivers given; also tables of railroad distances between Colorado towns and between the principal cities of the West and the rest of the United States.]

IDAHO. Clason's Industrial Map of the State of Idaho. Mineral Resources by Robert N. Bell, State Mine Inspector; Agricultural Areas by Jas. Stephenson, Jr., State Engineer. (1908.) [1:775,000.] 10 colors.

[See comment under "Arizona." Distinction made by colors between general mineralized area, important centers of present mineral production, coal deposits, phosphate deposits, irrigated areas, areas to be irrigated and farm lands having sufficient rainfall to dispense with irrigation. Relief in brown shading.]

MONTANA. Clason's Industrial Map of Montana. (1908.) [1:880,000.] 7 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[See comment under "Arizona." Principal irrigated areas in green, proposed irrigation projects in light green; coal deposits in blue, occurrences of minerals in red. Relief not shown.]

NEW MEXICO. Clason's Industrial Map of New Mexico. Mineral Resources by Fayette K. Jones, Economic Geologist; Agricultural Lands by Vernon L. Sullivan, Territorial Engineer. (1908.) [1:764,000.] 9 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[See comment under "Arizona." Occurrences of eleven kinds of minerals shown in red, coal deposits in blue stippling; irrigated areas, proposed irrigation projects, dry farming lands and "better dry farming lands" distinguished by colors. Relief in hachuring.]

UTAH. Clason's Industrial Map of the State of Utah. Economic Features by Rob. Forrester, Geologist. (1908.) [1:640,000.] 6 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[See comment under "Arizona." Occurrences of six kinds of minerals, hydrocarbon veins and outcrops of coal shown in blue, agricultural land in green. Telephone lines shown in red, distinction being made between those operated by different companies. Relief in hachuring.]

WYOMING. Clason's Industrial Map of Wyoming. Mineral Resources by Henry C. Beeler, Geologist. (1911.) [1:635,000.] 7 colors. Clason Map Co., Denver, Colo. Price, folded in cover, $2.00.

[See comment under "Arizona." Mineralized areas in yellow, occurrences of seven minerals in red, coal deposits in gray, irrigated lands in dark green, irrigation projects in light green.]

AFRICA

ALGERIA. Schéma indiquant l'état de la cartographie géologique dans l'Algérie orientale. [1:1,580,000.] [37¼° - 35½° N.; 6°5′ - 8°5′ E.] Accompanies, as Fig. 6 on p. 56, "Recherches géologiques récentes dans l'Algérie orientale" by P. Lemoine, *La Géogr.*, Vol. 27, 1913, No. 1, pp. 52–57.

[Helpful index map showing the extent of all geological maps thus far published of the Tell Atlas in the vicinity of Constantine.]

FRENCH EQUATORIAL AFRICA. Carte du Kouango. Dressée d'après les itinéraires des officiers, fonctionnaires et agents en service au Kouango dans ces dernières années. [1:1,600,000.] [7°50′ - 4°25′ N.; 19°55′ - 21°50′ E.] With inset: [Ubangi-Shari-Chad Territory, 1:16,000,000]. Accompanies, on p. 101, "Notes sur le Kouango" by F. Vallée, *Renseign. Colon.*, 1913, No. 3, pp. 99–106.

[Valuable map of the hitherto practically unexplored region to the northeast of the "big bend" of the Ubangi River.]

KAMERUN. Das Hinterland der Kameruner Nordbahn. Auf Grundlage neuer Aufnahmen . . . und des gesamten veröffentlichten Materials bearbeitet von M. Moisel, konstruiert u. gezeichnet von E. Lober, H. Nobiling, H. Wehl-

mann. 1:200,000. 5°56′ - 4°40′ N.; 9°34′ - 10°37′ E. 5 colors. Accompanies, as Karte 2, "Begleitwort zu der Karte 'Das Hinterland der Kameruner Nordbahn'" by M. Moisel, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 1, pp. 18–19.

[Important large-scale map, based on all the material available, of that part of the Kamerun Plateau lying to the north of the railroad into the interior. Relief in approximate contours and shading. Tribal boundaries and boundary between the grass lands and the forest shown. A splendid example of German colonial cartography.]

Morocco. [Bay of Tangier. (34°45′ N. and 5°45′ W.) Six sketch maps, 1:100,000, entitled:] (1) Cotes de Profondeur. (2) Relief Rocheux. (3) Nature des fonds. (4) Courants marins. (5) État de la Mer. (6) Marches des Sables. Accompany, on p. 107, "La Baie de Tanger: Notes de géographie physique" by Bou Beck'r, *Renseign. Colon.*, 1913, No. 3, pp. 106–110.

Morocco. Région de Marrakech. [1:2,000,000.] 33°40′ - 30°23′ N.; 9°55′ - 6°40′ W. Accompanies, on p. 51, "La Délimitance de Marrakech et les Opérations de Pacification" by C. Mangin, *Renseign. Colon.*, 1913, No. 2, pp. 49–73.

[Shows the route of Col. Mangin's troops in his campaign against Marrakesh and corollary expeditions.]

Spanish Guinea. Die Insel Annobon im Golf von Guinea. Nach Aufnahmen und Terrainzeichnung von Dr. Arnold Schultze konstruiert von C. Schmidt. 1:25,000. 1°24′ - 1°28′ S.; 5°36′ - 5°39′ E. 5 colors. Accompanies, as Taf. 24, "Die Insel Annobon im Golf von Guinea" by A. Schultze, *Pet. Mitt.*, Vol. 59, I, 1913, March, pp. 131–133.

[Valuable map based on original surveys. Relief in approximate contours in brown, drainage in blue, boundary of the forest in green, sand in yellow, author's route in red. Two views embellish the map.]

Sudan-Sahara. Croquis géologique de la région ouaddaïenne, dressé par le Capitaine Arnaud. 1:10,000,000. 22° - 8° N.; 12° - 24° E. Accompanies, as Fig. 5 on p. 35, "Aperçu géographique et géologique de la région ouaddaïenne (1910–1911)" by E. Arnaud, *La Géogr.*, Vol. 27, 1913, No. 1, pp. 33–40.

[Valuable geological sketch map of Wadai and the region to the west of it between the Shari depression and Tibesti. Routes of Capt. Arnaud and the detachments under his command shown.]

Upper Guinea-Sudan. Bassin du Niger: Principales aires de drainage et d'inondation. 1:20,000,000. 20° - 2° N.; 16¼° W. - 8¼° E. Accompanies, as Fig. 1, on p. 69, "Les Crues du Niger" by J. A. Millot, *Ann. de Géogr.*, Vol. 22, 1913 (Jan. 15), pp. 68–93.

[Shows isohyets of 25, 50 and 75 centimeters and of 1, 2, 3, 4 and 5 meters; also drainage area and area subject to inundation.]

ASIA

Russian Turkestan. Tektonische Kartenskizze des westlichsten Tianschan. Mit Benützung der Angaben von I. Muschketow und W. Weber gezeichnet von Dr. Fritz Machatschek. 1:840,000. 42°43′ - 40°10′ N.; 68°50′ - 72°5′ E. 2 colors. Accompanies "Der westlichste Tienschan: Ergebnisse einer geographischen Studienreise" by F. Machatschek, *Ergänzungsheft Nr. 176 zu Pet. Mitt.*, 1912.

[Shows, in two different colors, (1) dip and strike, (2) faults and (3) overthrusts, respectively in the Paleozoic and in the Tertiary series; also intrusive masses, the border of the mountains, and the author's and Mushketof's routes.]

EUROPE

Balkan Peninsula. Ethnographische Karte der Balkanhalbinsel nach allen vorhandenen Quellen und eigenen Beobachtungen von Prof. Dr. J. Cvijić. 1:1,500,000. 45°40′ - 38°50′ N.; 17°20′ - 30°0′ E. 24 colors. Accompanies, as Taf. 22, "Die ethnographische Abgrenzung der Völker auf der Balkanhalbinsel" (first part) by J. Cvijić, *Pet. Mitt.*, Vol. 59, I, 1913, March, pp. 113–118.

[Unqualifiedly the best map extant of the ethnography of the Balkan Peninsula, by the foremost authority on Balkan geography. In spite of the present

accuracy of the map, Professor Cvijić points out that it must only be considered to represent conditions as they existed at the outbreak of the Balkan War. In view of the general instability of racial conditions in the Balkans and the fundamental influence exerted upon them by the present war—an influence more potent than any since the Turkish invasion in the fourteenth century—the map is doomed to early obsolescence. The following racial units are distinguished: (1) Serbo-Croatians: (a) Orthodox, (b) Catholic, (c) Mohammedanized Servians, (d) Albanized Servians, (e) Orthodox Servians speaking Albanian; (2) Bulgarians: (a) Orthodox, (b) Mohammedanized (Pomaks); (3) Macedonian Slavs: (a) Orthodox, (b) Mohammedanized; (4) Greeks: (a) Orthodox and Catholic, (b) Mohammedanized; (5) Rumanians, including Kutzo-Wallachians: (a) Orthodox and Catholic, (b) Mohammedanized Kutzo-Wallachians, (c) Grecisized Kutzo-Wallachians; (6) Turks, Tatars and Gagauses: (a) Mohammedan, (b) Greek Orthodox Turks; (7) Albanians: (a) Mohammedan, Orthodox and Catholic, (b) Servianized. In the Serbo-Bulgarian boundary district between the Timok and Isker Rivers, which is transitional dialectically and is sometimes counted Bulgarian racially, Professor Cvijić represents the racial as coinciding with the political boundary, in view of the growing consciouness of nationality in the present generation and the geographical nature of this political boundary. The corresponding parts of sheets 51 to 54 of Stielers Hand-Atlas are used as the base for the map.]

FRANCE. Carte comparée de l'île de Noirmoutier en 1702 et en 1900. 1:70,000. [47°0′ N. and 2°15′ W.] 2 colors. Accompanies, as Pl. 1, "Les Modifications littorales de l'île de Noirmoutier" by E. Clouzot, *La Géogr.*, Vol. 27, 1913, No. 1, pp. 1–32.

[Island lying off the Atlantic coast of France, south of the mouth of the Loire, part of which has been reclaimed from the sea. High and low water line for 1702 and 1900 shown, as well as area reclaimed.]

GERMANY. Magnetische Karte vom Deutschen Reich 1912. III. Blatt: Linien gleicher westlicher Deklination (Isogonen) für 1. Januar 1912. Nach den Ergebnissen der magnetischen Landesaufnahmen, mit Benutzung weiterer magnetischer Messungen entworfen von Karl Haussmann. 1:1,500,000. 1 color. With two insets: (1) Isogonen für 1911,0 im magnetischen Störungsgebiet in Ost- und Westpreussen. Gemessen von der Trig. Abteilung des Kgl. preuss. Generalstabs. Berechnet und entworfen von Geh. Reg.-Rat Prof. Dr. Ad. Schmidt. 1:1,000,000. 54°30′ - 53°10′ N.; 18°30′ - 20°50′ E. 1 color. (2) Isoklinen [*sic*] für 1901,0 im magnetischen Störungsgebiet des Ries und Umgebung. Gemessen und berechnet von Prof. K. Haussmann. 1:500,000. 49°0′ - 48°35′ N.; 10°0′ - 10°50′ E. [Meridians incorrectly given on map itself.] 1 color. Accompanies, as Taf. 23, "Die magnetischen Landesaufnahmen im Deutschen Reich und magnetische Übersichtskarten von Deutschland für 1912" (third part) by K. Haussmann, *Pet. Mitt.*, Vol. 59, I, 1913, March, pp. 119–121.

[For Blatt I and II see under "Germany," *Bull.*, Vol. 45, 1913, No. 5, p. 398.]

TURKEY, ETC. (a) Esquisse hypsométrique du Sandžak de Novi Pazar. 1:1,500,000. 43°40′ - 42°45′ N.; 18°52′ - 20°35′ E.

(b) Voies de communications dans le Sandžak de Novi Pazar. 1:1,500,000. 43°50′ - 42°40′ N.; 18°57′ - 20°50′ E.

Accompany, as Figs. 1 and 2 on pp. 43 and 60, respectively, "Le Sandžak de Novi Pazar" by G. Gravier, *Ann. de Géogr.*, Vol. 22, 1913 (Jan. 15), pp. 41–67.

WORLD AND LARGER PARTS

WORLD. Map of the World, Showing Principal Wireless Telegraph Stations. [Mollweide's projection, 1:200,000,000.] Accompanies, on p. 251, "Some New and Improved Instruments and Apparatus for Geographical Surveying" (first part) by E. A. Reeves, *Geogr. Journ.*, Vol. 41, 1913, No. 3, pp. 249–271.

[Distinguishes between (1) principal permanent wireless stations, (2) permanent wireless high power stations, (3) Imperial scheme stations.]